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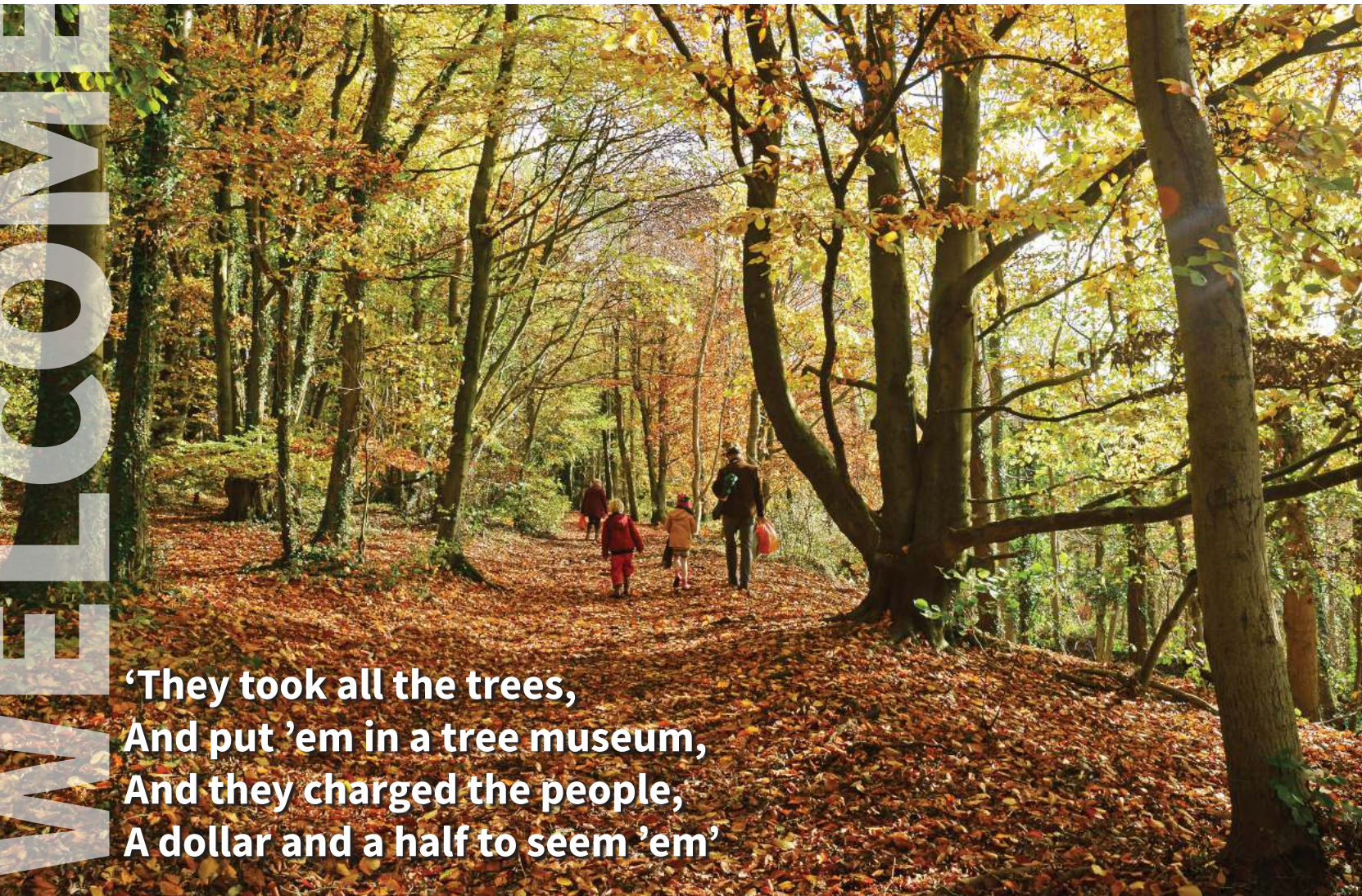
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WOODWORKING CRAFTS

Issue 60



**'They took all the trees,
And put 'em in a tree museum,
And they charged the people,
A dollar and a half to seem 'em'**

Big Yellow Taxi – Joni Mitchell lyric

Trees are an emotional subject, from songs to political protest to living in the woods – trees rather like sunlight, the sea and Mother Earth, are part of the soul of humanity. Take away the trees and we are impoverished; it's unavoidable in the desert, but we expect to find trees everywhere else. And yet, and yet ... trees are always under assault, managed tree felling is fine, but major infrastructure projects threaten whole forests, cattle farming exposes weak soil, tree loss on hillsides combined with the herded footprints of sheep allows rainwater to race down valleys and exacerbate flooding. There are so many ways we need trees, to capture carbon, to control groundwater, as a source of valuable timber, an ecosystem and for a diversity of species.

But do you know your trees? Those who have practised their craft among woodland trees can recognise and understand the source of

the material, but most of us struggle to identify trees as we 'walk in dappled sunlight 'neath the leafed canopy'. Is that an oak? What sort of oak? A field oak? A sessile oak? Maybe a Turkey oak? Botanical research now tells us that trees communicate, sending messages via fine fungating tendrils; trees know when they are under attack or sick and yet we can't even care to name them correctly. In some cultures the woodsman will give thanks to the tree before putting it to the axe, because he knows the true value of the ancient giant standing before him.

So next time you go for a woodland walk, do please take a tree identification handbook and learn more. The better we understand the world around us, the more we can cherish it and save it for future generations...

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Woodworking is an inherently dangerous pursuit. Readers should not attempt the procedures described herein without seeking training and information on the safe use of tools and machines, and all readers should observe current safety legislation.

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WOODWORKING CRAFTS

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KEY CABINET



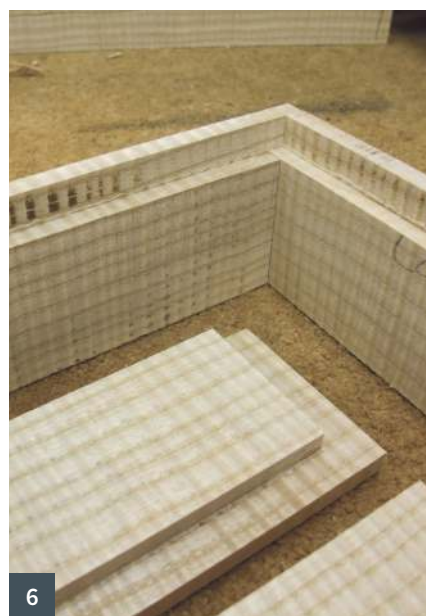
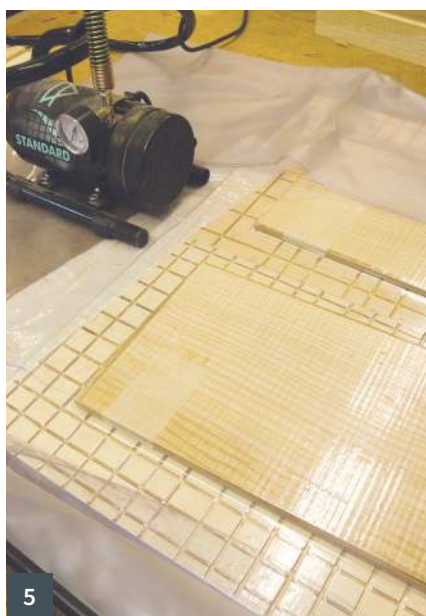
PHOTOGRAPH BY JON BANFIELD

Grain choice is crucial to the success of David Barron's batch-made cabinets

This cabinet design appeals on many levels, being attractively shaped, almost sculptural to look at and making use of curved timber, which often displays lovely figuring. Its construction is simple and quick, making it very reasonably priced, and one of my favourite designs to make.

Inspiration came from a cabinet by Matthew Burt that I saw exhibited at the Celebration of Craftsmanship & Design a few years

ago. I have made this cabinet from both olive and white ash as well as brown oak and elm. Before committing myself to a less than perfect cut I use a negative template to frame the grain on the board. In isolation the 'picture' helps to ensure I get the best out of the board. My liking for these cabinets doesn't end there. I'm particularly pleased with the delicate little click that comes from the 4mm magnets used to hold the door closed.



PHOTOGRAPHS BY DAVID BARRON

Making templates

- 1 Because I produce these cabinets in small batches, I make up templates from MDF to speed up the shaping and achieve consistent results. After carefully shaping the MDF, the edges are spread with a generous coating of epoxy resin that is readily soaked up, the excess being wiped off before it dries. The resulting edges are rock hard and easily able to take the pressure of the bearing-guided router bit without wearing. If you want to make this cabinet as a one-off, there's no need to make the templates.

Wood grain choice

- 2 Wood grain choice is what really sets off these cabinets. Excellent use is made of the curved and often most figured part of the tree. This is most likely to be found on waney-edged English timbers rather than processed American timber.
- 3 Use of a 50mm board re-sawn on the bandsaw is the best way to achieve a pleasing book match. Consecutive boards

of thinner material would also suffice.

- 4 Double-sided tape is used to secure the template to the board for shaping on the router table.

Timber movement

- 5 I always make sure that my furniture is designed with a healthy respect for wood movement. The cabinet door and the carcass are made from solid timber whereas the back is veneered on MDF. This allows me to glue in the back panel for a nice rigid box without any fear of future problems. To limit the potential of the doors warping or twisting I also select quartersawn timber. However, even with all this care I would still avoid siting the cabinet above an uncovered radiator. The back boards are veneered in a vacuum press. The resulting thickness is used to calculate the rebates for the back panel.
- 6 Rebates are created for the back panel in the four carcass components.



MILLER DOWEL JOINTS

7 In the past I have used dovetails for the carcass but here I decided to use Miller dowels as a potentially faster alternative. Before assembly I notched the sides to a depth of 6mm to receive the top and bottom. This was done with a sharp rabbetting bit on the router table. The same 6mm setting was also used to rout the rebate for the back panel in all the carcass pieces. This meant there were no stopped cuts and no cleaning up the rounded corners after assembly. The interior surfaces were sealed with a few coats of shellac. Before drilling the holes with the specially tapered bit provided, great care must be taken to ensure the joints are tight and firmly held throughout the drilling operation. Unsightly gaps could all too easily appear. In addition all pieces must be flush otherwise the rebates for the back panel will not line up and again gaps will result. With all the holes drilled the Miller dowels are dabbed with glue and tapped home. This is done with the carcass still clamped and light taps until the note changes and resistance is felt.

Finishing the doors

8 With the carcass done it is time to finish the doors, and a high-angled plane makes fast work of removing the tear-out on the

rippled grain, this being followed by machine sanding using 180 and 240 grit sandpaper.

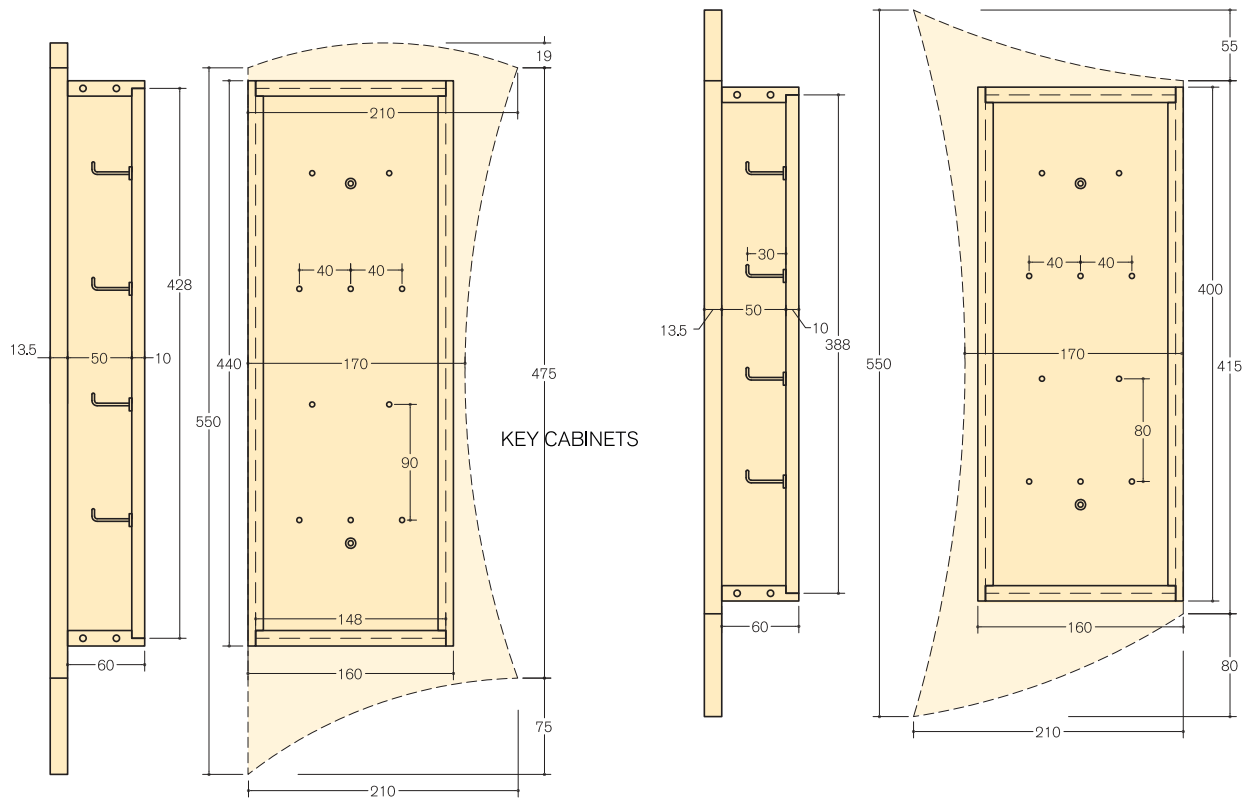
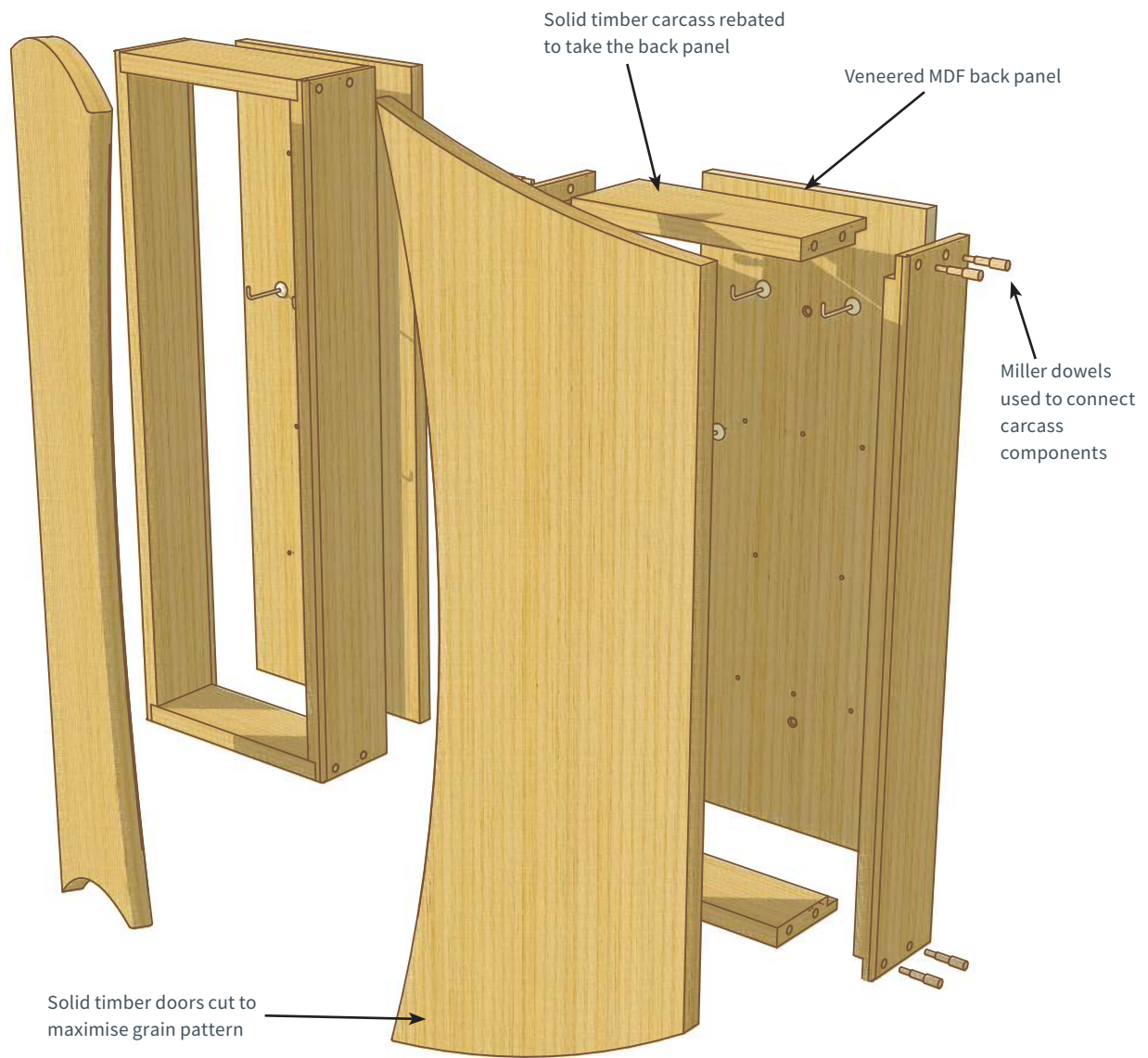
9 The edges are finished with a gentle bullnose profile, which is very tactile and much nicer than a normal square edge. I would normally use a router bit for this but the curves dictate planes and spokeshaves. The final sanding is done with the profile from an old moulding plane. For the finish, I used Osmo Hardwax oil rubbed on very thinly with a rubber. Five coats give a nice sheen and plenty of protection.

The hinging process

10 Normal cabinet hinges are used but to keep them as discreet as possible, line them up with a matching bead. This is formed with a scratch stock on the carcass side and the hinge is routed so both leaves are in the carcass side. The other side of the hinge is surface mounted on the door, requiring extra care to line it up properly. This method only allows the door to open 95° but this is not a hindrance to its intended use. Magnets are used as door catches with an 8mm size on the carcass and a 4mm size on the door. This gives a positive but light hold in keeping with the scale of the cabinets.

Back panel

The back panel is sealed with a few coats of shellac and then carefully fitted on a shooting board into the rebate. The pilot holes for the hooks are drilled on the drill press to ensure perfect alignment and squareness. By utilising the depth stop the holes are drilled to their correct depth without risking going right through the panel. The 90° hooks are more practical than the more common rounded ones. A small chamfer is planed on the inside edges of the back panel before it is glued into place with a bead of epoxy resin. The assembly is then clamped firmly in place to ensure no gaps and left overnight to harden up.





STRONG CHAIR JOINTS

Chairs have to take the strain, so John Bullar shares his key jointing methods that will be up to the task

Chair frames need to be supple structures. Unlike most furniture, which simply has to bear its own weight and perhaps the static load of some contents, chairs have to carry people, who may be 20 times as heavy and rarely sit still.

The dining chair in particular is often on the move as its occupant leans on the arms, slides the seat beneath them, and shuffles their backside around on it and then, heaven forbid, rocks on the back legs. This means that the joints of a chair can be severely stressed and need special consideration in their design and build.

In a conventional chair frame the rear legs rise above seat level to form the stiles of the back. These are mortised to receive tenons on the seat rail ends and this is the joint that suffers most stress. Downward loading on the seat applies a shear stress across the tenon's grain to which the wood is quite resistant; however, in combination with a horizontal force on the seat back this will rack or twist the tenon in its mortise. This compresses the shoulders and loosens the joint or it can compress the underside of the tenon next to the shoulder until it snaps.

As well as ensuring the joint is large enough, the racking effect is reduced both by equipping the tenon with strong shoulders and by fixing it securely into the mortise. Fixing is either by mechanical restraint such as a peg or wedge or by adhesive, or in many cases both. The cheeks of a tenon provide a large surface area for glue to bond long grain to long grain, making a strong adhesion, while pegged or wedged joints will survive even if the glue fails in damp conditions.

Animal glues

Traditional animal glues are gap filling, have excellent grab and are incredibly strong when set. However, their biggest plus point is that they can be dismantled and reassembled. If, for example, a joint needs to be separated to replace a component, the animal glue can be softened with hot water or steam. Deposits of old glue left in the joint will readily bond to new animal glue, unlike modern synthetics, which reject new glue.

Before damp-proof courses and central heating, it wasn't just the houses of ordinary folks that suffered from rising damp; the furniture inside them did too. This softened animal glue as well as making it attractive to insects and fungi, which was often a serious problem limiting the furniture's life. In a dry home, however, animal glue's life is practically unlimited.

Synthetic glues

When cramped under pressure, waterproof PVA glues set as cross-linked polymers forming a strong flexible bond between fibres on wood surfaces, and, as the adverts say, the glue is 'stronger than the wood itself'.

Mortise and tenons rely on tight-fitting cheeks to achieve pressure between the long-grain surfaces while the glue bonds, but this pressure is restricted by the need to slide the joint together during assembly.

Although they are simpler, edge joints, lap joints and halving joints have the advantage that they permit sideways cramping between long-grain surfaces so producing a stronger adhesive bond; however, the glued surface strength transmits strain to the unbonded fibres that lie outside the glue line where the natural side-to-side attachment of wood fibres is relatively weak.

If too much reliance is placed solely on the glue bond for a strong joint, seasonal movement in different directions combined with the dynamic loads will eventually cause wood failure alongside the glue line. Chair joints must therefore have good mechanical strength if they are to last, whatever type of glue is used.

Other synthetic glues, while having the benefit of gap filling, tend to be weaker than PVA and also more brittle. This makes them less suitable for surviving the movements in a chair frame.

Angled joints

Chairs are angled to give the back a rake for leaning against, the legs a splay for stability and the seat a taper front to back for comfort. Although some designs achieve this by shaping components while

keeping the joints at right angles, most chairs use angled joints and often compound angled joints.

The mortise can be chopped on a slant or, equally commonly, the tenon can be tilted for easier alignment of the shoulders. So long as there is long grain passing right through the tenon from end to end it will not be significantly weakened by being cut on an angle.

Measuring the spacing and inclination between angled components is tricky and you may need to improvise some special measuring tools for this. I use a double-ended protractor gauge with reasonable success. A more engineered solution is to draw the chair using angled projections with sufficient precision to measure directly, or to draw the chair on CAD and get the computer to work out these details. In the workshop you need to convert the numbers into accurate cuts.



1 Clamping angled joints using a band clamp with the frame stood on a flat reference surface **2** Joints are trial fitted before the components are shaped down to final size **3** Modified protractor gauge measures the angles and spacing between two ends of a rail – one of the trickiest steps in making a new chair

PHOTOGRAPHS BY JOHN BULLAR

The obvious way for a craftsman to cut awkward angled joints is with hand saw and chisel. For small numbers this makes sense and is satisfying, while making larger quantities, like a set of dining chairs, justifies the set-up time for using a jig to cut the joints.

A well-aligned bandsaw will cut good straight tenons; preset angles can be arranged by tilting the table or by placing a platform on it.

Hollow chisel mortisers chop square-sided sockets which can be linked in a series to make a rectangular mortise. Either the wood or, in some cases, the motor unit, can be tilted to make angled mortises.



4 The bandsaw produces the cheeks of tenons on a solid seat. The waste is then removed with coping saw and chisel **5** Angled joints, in this case cut on a frame mortise-and-tenon jig, normally use a slanting tenon to fit a straight mortise



Strong tenons

Raised moisture content causes wood to swell across the grain rather than along it. This tightens a tenon between the end-grain walls of its mortise and can cause an effect known as compression-set which permanently deforms the wood. The result is that when the moisture content falls again, and the wood shrinks across the grain, the joint becomes loose. Only tenons on deep rails are susceptible so dividing the joint into a pair of double in-line tenons eliminates the problem.

A single tenon is normally half the thickness of the wood to ensure one half of the joint is no weaker than the other. Tenons cut on shallow rails can suffer from insufficient glue area on the long-grain faces of the mortise. The solution here is to divide the joint into a pair of twin tenons side-by-side, with each tenon one quarter the thickness of the wood. This doubles the glue area.

Pegging a joint will keep the tenon shoulders pulled in tight so long as the peg is fairly close to the shoulder line. It must be far enough

The tenon shoulders must then be angled to align.

The frame mortise-and-tenon jig is specifically designed for cutting repeatable angled joints using a router. The jig provides a small table to support the router base and templates to guide the router movements. Each template has an outline to guide the router around the tenon and an inset to locate the mortise. Wood is clamped below an aperture in the table that the cutter passes through. Different clamp angles are used for the production of different joint angles.

away to avoid splitting the mortise sides but not so far that shrinkage of the mortise sides creates a shoulder gap.

Wedges inserted in slots in the end of a through tenon keep the joint locked tightly together. The slots are cut with a saw kerf and finish in a drilled hole to discourage the tenon from splitting further. The locking action is improved if the mortise has its ends pared away with a chisel to flare them slightly inwards.

In blind mortises with stub tenons, fox wedges can be fitted before assembly. As the joint is driven together the wedges are pressed against the mortise base, splaying the tenon. Although simple enough in principle and very effective, fox-wedged joints need careful measurement if they are to work properly.

Glue blocks between rails reinforce the frame and prevent compression of each corner. This in turn prevents expansion at adjacent corners, which stops the frame as a whole from racking.



6 Twin tenons have the advantage of offering extra mechanical strength against racking



7 Pegged mortise and tenons on country furniture are resistant to glue failure in damp conditions



8



9



10



11

8 Through tenons provide maximum depth and a visual assurance that the joint is tightly wedged **9** Fox wedges flare the end of a tenon as it is pressed into a blind mortise. The mortise is slightly flared inside so the joint locks tightly and permanently together **10** Traditionally chair makers fitted glue blocks between rails to reinforce the frame and prevent it racking. These also support the corner of a drop-in seat **11** Joints between the rear stiles or legs and side rails of a seat are likely to be the most highly stressed

Windsor chairs

Traditionally, craftsmen called 'bodgers' worked in the Chiltern Hills north of Windsor using pole lathes to turn chair legs and spindles. These had tapered ends to fit the holes that were bored in wide solid seats.

Tapered spoon bits were used to drill a conical mortise in the seat,

allowing the turned leg to be driven in as far as required for tightness. This type of joint maintains a large area of contact for a tight frictional fit, while the chair design keeps the joints in compression.

The evolutionary design of the Windsor is a case where the very distinctive form follows its function – almost a mass-production system for long-lasting chairs.



12

12 A rounding plane cuts tapered ends to form tenons on legs and rails for a Windsor chair. The old wooden rounder is adjustable for different diameters



13

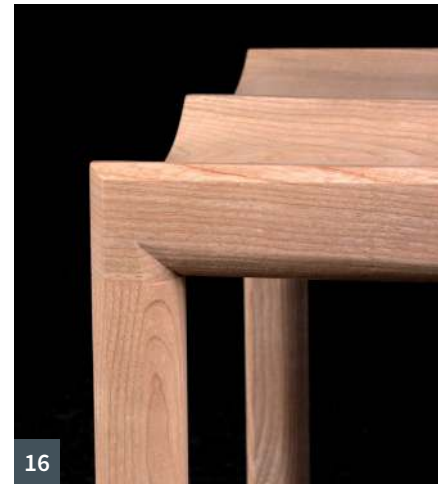
13 Legs and stiles are driven into tapered holes in the solid seat



14



15



16

14 Turned ends on legs can produce joints with accuracy for a tight fit **15** Good-quality Forstner bits produce an accurate round mortise hole **16** Carving the finished joint can produce a form that is diverse from the construction

Dowels

Dowels have gained a poor reputation for chair joints because they have in the past been used inappropriately. Dowels themselves rarely fail; however, making a row of small dowel holes is effectively the same as chain-drilling and forms a line of weakness in the surrounding wood where the joint is likely to fail.

Large cylindrical tenons turned on the ends of legs or rails have the virtue of making a precision fit in an accurately drilled mortise socket made with a Forstner bit. The tightness of this fit provides good pressure between the mortise and tenon as the glue sets. A large cylindrical dowel can be turned and separated off for use as a loose tenon.

MIXED MATERIALS

In conventional woodworking construction the glue simply stops the joint from sliding apart while the mechanical strength comes from the shape of the wood. However, the steel dowel joint uses the glue for the mechanical fit as well as for adhesion.

Steel threaded rod is set in an epoxy resin-filled bore to make a strong in-line joint in fine-section legs. The bore must provide space for the glue to squeeze up around the steel and for surplus to escape. If there is a risk of a twisting force on the joint then a groove cut across the threads with a hacksaw or angle grinder will prevent the steel rotating in the epoxy.

In principle the joint is simple but there are two tricky aspects to making it: one is getting the resin to flow evenly around the rod as it is pressed in place; the other is holding the joint in accurate alignment while it sets. The strength and stiffness come from the steel



17

17 More in common with bone implants than conventional woodworking, a steel rod is set in epoxy resin to produce this strong joint in a fine-section leg

while the mechanical fit of the joint comes from the core of resin.

As with any novel technique, to be sure of success you need to make a trial joint first. When the epoxy has set and cured, test it for strength, then finally cut it open to examine the interior.

Chair joints must be strong, but rigid strength is not always enough. They also need to be forgiving of movement without becoming slack. And if the chair is intended to be capable of lasting not just years, nor decades, but for centuries, then history shows that the joints also need to be maintainable.

CHIP CARVING FOR BEGINNERS

Murray Taylor takes you from sharpening your knives
to making your first triangular chip cut



In this article, I'll introduce you to chip carving and take you through the process of sharpening, choosing your wood, carving positions, drawing a grid and then on to your first cuts. I have taught a lot of people the art of chip carving and the greatest difficulty they seem to have is getting to grips with sharpening. I hope to break this down into a series of logical steps and try to remove the feeling that it is a 'black art'.

What we are trying to achieve is a blade that tapers from the back edge to the cutting edge as a smooth taper, culminating in a fine micro-bevel. The sides of the blade and the bevel should be finished to a high polish such that, when drawn across the end grain of a piece of wood it cuts very easily without any tearing or jaggling and leaves a silk-like finish.

The process of sharpening can be broken down as follows:

- 1 Examining the blade
- 2 Deciding where the sharpening process should start
- 3 Removing unwanted metal
- 4 Honing
- 5 Polishing

When you are commissioning a new blade examine it carefully for factory grinding marks, straightness, a pronounced secondary bevel and nicks in the cutting edge. This is best done with the aid of a magnifying glass. If there is a major defect ask for the knife to be replaced.

Deciding where to start

If the examination of the blade proves to be satisfactory and there are no glaring faults then you can start to sharpen it. I use ceramic stones. Ceramic stones come in just two grades, medium and fine. However, in reality the grey stone is fine and the white stone ultra-fine.

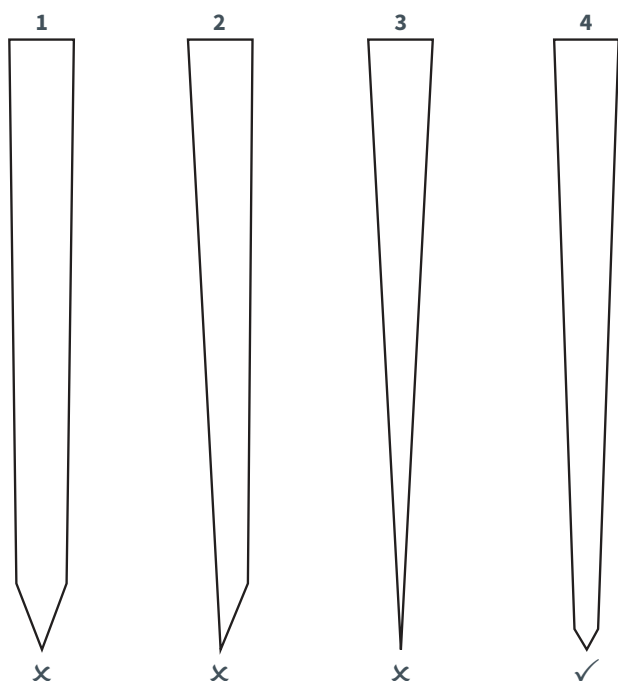
Ceramic stones are available as bench stones, 200 x 50mm portable stones which are suitable for a tool box 100 x 50mm and as a very portable double-sided stone 125 x 25mm. Ceramic stones are incredibly hard, long lasting, do not wear out and can be used dry. On the other hand they are expensive and brittle but seem to be the preferred sharpening medium for many chip carvers. There are, however, alternatives such as diamond plates ranging from coarse to ultra-fine, waterstones, microfilm abrasives and cutting pastes that are applied to flat plates and honing using a piece of MDF or leather as a base for final stropping.



PHOTOGRAPHS BY MURRAY TAYLOR

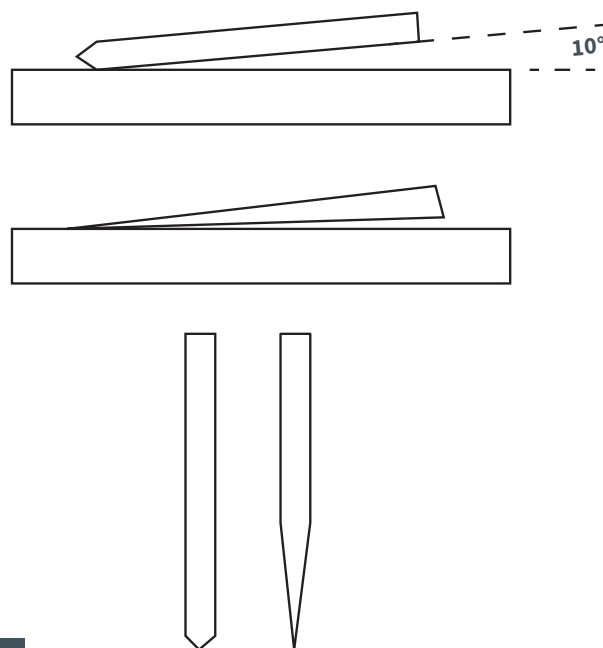
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1 A selection of ceramic stones



2

2 Blade sections: 1. Secondary bevel too large; 2. Sharpened to one side; 3. Too fine an edge; 4. Correct profile with micro-bevel



3

3 Angle of working on diamond stone

Removing unwanted metal

If a lot of metal needs to be removed because there is a pronounced secondary bevel for example, then it is quicker to use a diamond stone, usually starting with 600 grit and going on to 1,200 before finishing on the ceramic stones. Diamond stones are readily available in many sizes and grades, but just remember that you get what you pay for.

Do not try to use any kind of power sharpening device – you will probably ruin the knife and it could be very dangerous.

If you are starting on a diamond stone, the blade should be held at approximately 10° to the stone and moved backwards and forwards with the objective of reaching a stage where the surface of the metal runs smoothly from the back of the knife to the cutting edge.

It is important to maintain an even pressure along the length of the

cutting edge. As the length of the blade is short compared to the handle of the knife, it is a common fault for the tip of the knife to rise and not be in contact with the stone due to the downward pressure on the handle. This can be prevented by pressing down on the blade.

Move the blade backwards and forwards along the stone until a burr is produced along the cutting edge. You can test for a burr by sliding your finger over the cutting edge, as shown in photo 6. When this is achieved you can turn the blade over and repeat the process on the other side.

At this stage, the blade is ready for honing on the grey ceramic stone. Work both sides as before until a fine burr is reached on each side. I know this seems to be a lengthy process but there is no shortcut.

A good idea when sharpening knife blades is to have the stone at the

edge of a table so your hand does not get in the way. Or you can make a simple raised block to hold your stone.

The last stage of sharpening is to raise a very fine burr on each side of the blade using the white ceramic stone and finally finish the edge on a

dressed leather strop so that you have a highly polished micro-bevel.

It should be noted that, unlike the honing process, the blade only travels on the strop with the cutting edge trailing – in this way the blade will not cut into the leather.



4 Keeping an even pressure on the blade **5** Using a raised block, put your blade flat on the ceramic stone, then raise the back edge no more than 1mm
6 Testing for the burr **7** Stropping a blade **8** Testing the blade sharpness on some wood

Choosing your wood

When you start chip carving, due to their ease of cutting, it is best to use either lime or basswood. You will need a practice board of approximately 200 x 150 x 13mm – the dimensions are not critical but this is a convenient size to hold.

The surface should be smooth and clean. The old books always stated that they should be planed and that sandpaper should not be used as silica residues can damage a blade. These days,

however, modern abrasives are very suitable to sand the surface.

Lime is readily available but basswood is a little more difficult to obtain in the UK, however it is available in prepared boards which are excellent for beginners as it is a little softer than lime. Once you are proficient at chip carving you can try woods such as walnut, beech or even sapele. Your knife needs to be very sharp and the chip size small.

One of the great advantages of chip carving is that you do not need



9 Using a modified bench hook **10** Working with a cushion and carving board

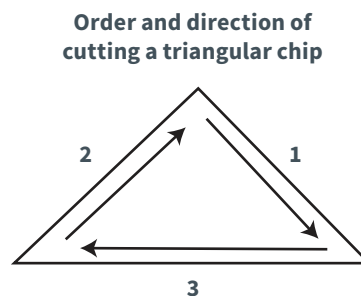
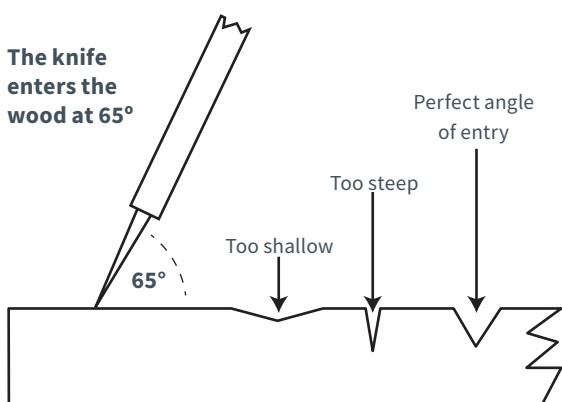
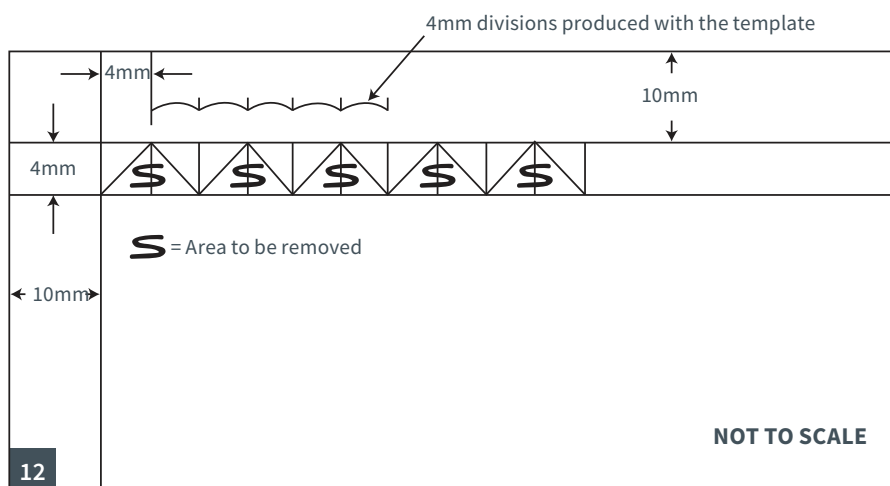
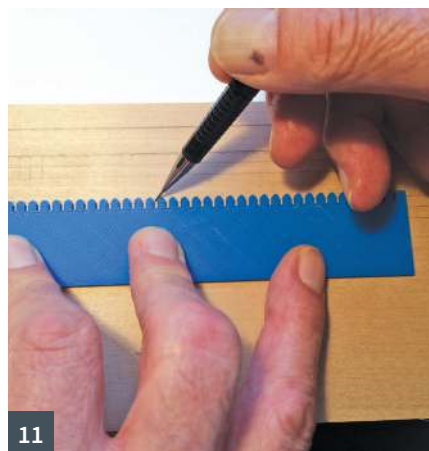
a lot of space. There are two schools of thought regarding the carving position – some people find it more comfortable working at a table while others work on their knee. Both work well but we must pay due regard to safety. If you work at a table you need to use a modified bench hook, or at least a piece of non-slip matting, and if you work on your knee it is best to use a cushion and carving board. Not only does this protect you but also raises the work to a more comfortable position.

Although accidents in chip carving are rare it is better to be safe

rather than sorry, so I would suggest that you wear a protective glove on your free hand if you feel more comfortable that way. The thumb of the knife-holding hand should always rest on the wood. In this position the knife will not slip and you are very unlikely to cut yourself. However, if you feel more comfortable you could wear a glove on this hand as well.

You should sit in a comfortable position and have adequate lighting. There are small portable, rechargeable LED lights that are ideal for the purpose.

Making your first cut



11 Showing 4mm grid and using a 4mm template **12** Marking the triangles **13** Showing the cutting angle of 65° and the order and direction of cutting a triangular chip

You are going to start by cutting a basic triangular chip and if this is done correctly with the cutting angle maintained at 65° for the three cuts, you will end up with a chip in the form of a pyramid.

Before starting on your cuts, it is a good idea to mark the area of wood to be removed as it is easy to get confused when you first start.

Using your T-square, draw two lines 4mm apart on the wood, then mark off a series of 4mm divisions along the top line from which you can use your T-square to draw the vertical lines to form the 4mm square grid.

I know that marking divisions at 4mm intervals can cause problems but, with a clearly marked ruler and a lot of patience, you can get a very accurate grid. Alternatively you could use a template with 4mm divisions. Just place the template on your

practice board and run your pencil along it. This will produce a series of scallop-shaped marks exactly 4mm apart, from which you can mark your grid as described above.

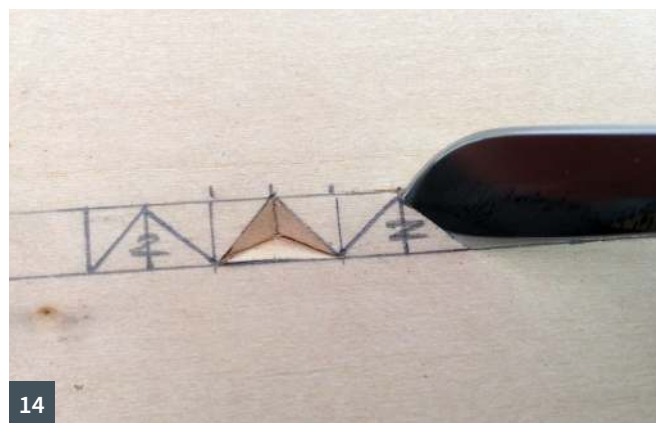
Now join up the diagonal corners of the grid to form triangles.

Holding your cutting knife at an angle of 65°, make your first cut by pushing the knife down into the wood, as in the diagram.

At this stage, it is necessary for you to imagine the pyramid that you are going to remove and the position of the knife point in relation to the apex of the inverted pyramid. When you have made your first cut, rotate the board to make the second and third cuts. If you have done this correctly the chip will just pop out, if it does not you will need to go round the cuts again. Never try to prise a chip out with your knife, – you could damage your work or, more importantly, you could damage

the tip of your knife. Some books on chip carving refer to the use of 5mm grids, but I do not recommend that you use them until you have mastered using the 4mm grid, as you will find the larger chips very difficult to remove.

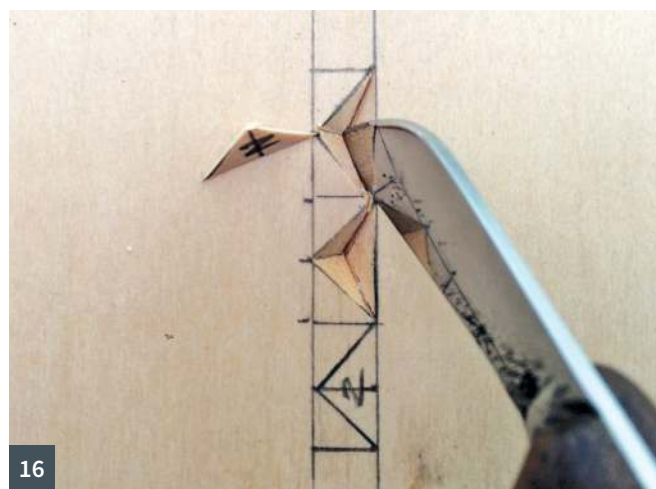
Some chip carvers advocate the use of two ways of holding the cutting knife. The first is the way I have shown, where the thumb is resting on the wood and, for the second cut, to flip the knife over and rest the thumb on top of the blade. Most of the people I have taught find this flip-over hold very difficult and personally I do not like the idea of taking my thumb off the wood for safety reasons. If you are comfortable with this method it should be noted that the order of cutting the triangle is the same but the direction of the second cut is reversed.



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14 The three cuts to release the chip: cut 1 **15** Cut 2 **16** Cut 3

The stab knife

The stab knife, as the name implies, is used to press into the wood to make a decorative mark.

It is held as shown and can be used to make a variety of patterns and enhance geometric or freeform work. Unlike the cutting knife it is sharpened at an angle of 30° on each side.

Now that you have made your first cuts you need to master the art of removing triangular chips neatly and efficiently, so I will now impart the secret of achieving this – practice, practice, practice.



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17 Sharpening the stab knife at 30° each side **18** Using the stab knife



Rosewood writing slope

YouTuber Mitch Peacock makes his first writing slope from a beautiful plank of East Indian rosewood

Virtually redundant in the modern era, where correspondence is typed or even spoken into electronic devices, the writing slope, or writing box, is now a luxury gift for the person who has everything. How different from two centuries ago, when social media posting started with opening your writing slope, the ink pot contained within and taking out your dip pen. From softwoods to exotic hardwoods, solid or veneered, plain or decorated, writing slopes were commonplace in households.

Build to order

Although on my personal bucket list of woodworking projects, having played with an inherited one as a small boy, it was a request from a viewer that got this build started. 'Please could you build an East Indian rosewood writing slope, film the process and post it on your YouTube channel.' Soon I was searching for a source of this rosewood, which is no longer exported.

Design

I wanted to make the slope compact, yet large enough to store A4 paper and a tablet inside, of mostly solid construction rather than veneered, and showing off the beauty of the rosewood. To this end, I designed from the size of the contents outwards, using secret mitre dovetails for the box corners, and a full wraparound grain match. The top and bottom would be veneered, to help prevent cross grain expansion and contraction issues once built. The only decoration would be a contrasting band around these panels, and for that I chose to use English holly. Internally, I wanted to create a secret compartment different to those I had seen before, and opted for a lifting, main compartment divider. A pen tray and two flanking compartments cover the concealed compartment, and are topped with three grain-matched lids.



PHOTOGRAPHS BY MITCH PEACOCK

Materials preparation

The moisture content of rosewood plank I selected was reading a few points higher than a sample piece of rosewood I have had in the house for years, and so the first consideration was to dry it out a little. At 50mm in thickness, this could have taken quite some time, so I rough cut some boards from it on the bandsaw, allowing sufficient thickness that I should be able to remove any movement as I prepared the components for the slope. Two of these boards would be used to make the grain-matched box sides.

- 1 At the same time, I cut the veneers to use for the top and bottom, smoothing the plank's face before each veneer was cut. The boards and veneers were stacked with sticks between and weights on top, and allowed to acclimatise in the house for some months, until the moisture content stabilised. At this point the boards were flattened and brought to working thickness.

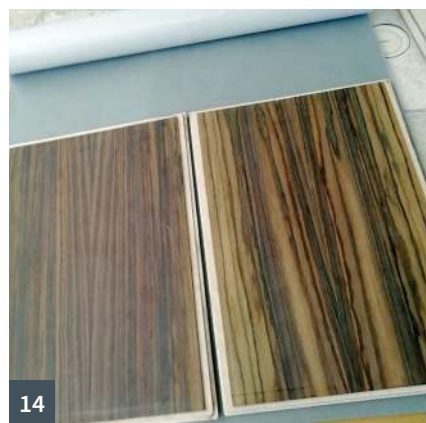
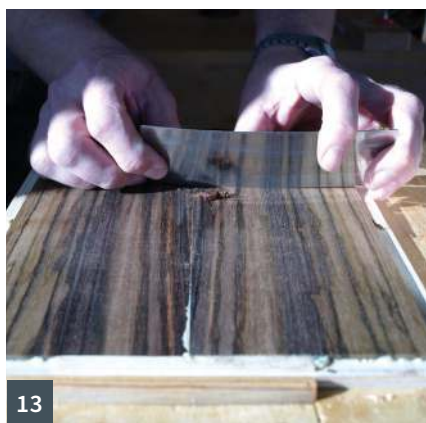
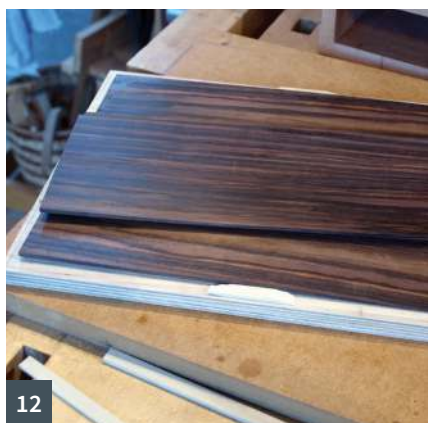
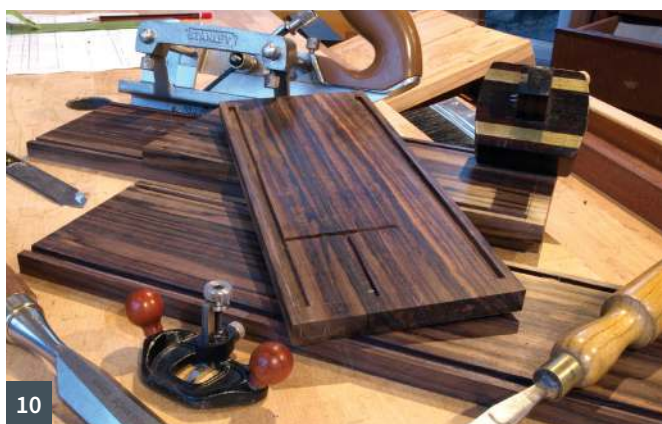
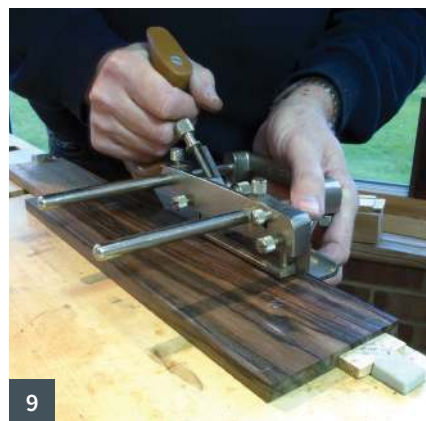
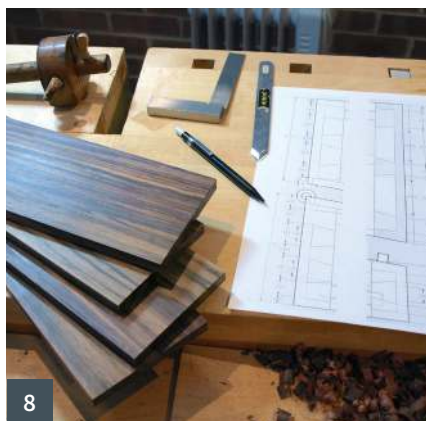
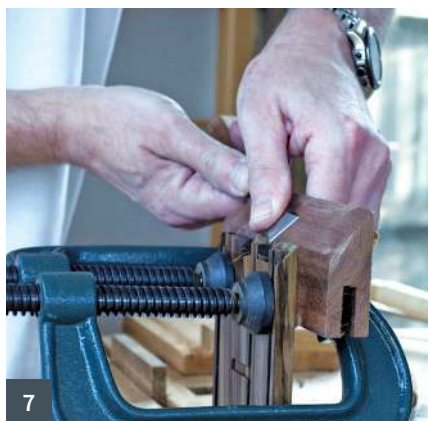
Full grain match

- 2 Achieving a full grain match around a box requires re-sawing a board, and using those sawn surfaces as the show faces of the box sides.

- 3 Alignment marks made before re-sawing ensured that the two boards remained aligned as the first corner was sawn, ensuring a grain match.
- 4 From this end of the two boards, one long side and one short side of the box is marked and sawn, making two more grain-matched corners with the offcuts. Sawing to length the final two sides should result in the fourth corner also being grain matched. Having gone to the length of matching the gain, the only way to show it to full advantage is with a mitred joint.

Secret mitre dovetail

- 5 While loose tenons, such as Dominoes, could be used to strengthen a plain mitred joint, I prefer to stretch my hand tool skills by creating secret mitre dovetails. Preparation of this type of joint is described in more comprehensive books about joinery, but I find it useful to imagine a mitred through dovetail joint, covered with thick veneers, mitred at the corner. Once that image is in your mind, you can see that you need to cut the pins and tails without piercing the outside face at all.
- 6 This is achieved with saw cuts at 45° to the inside face of the sides, and a lot of chopping and paring.



- 7** The mitres on larger projects can be shoulder planed, but for this box I pared them using a clamped-on guide block.
- 8** Because the box will be sawn open later, layout of the dovetail pins and tails is critical. A mitred area needs to be left within each joint, which when sawn through will appear as a simple mitre: we don't want to saw through a tail or pin.

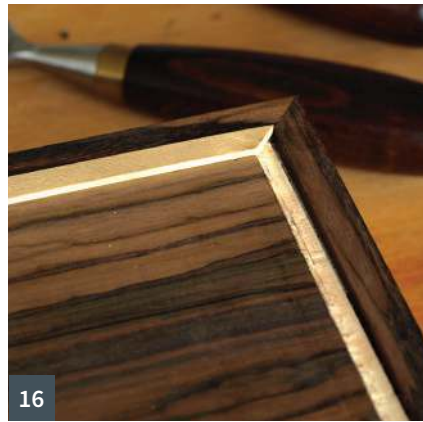
Internal compartments

- 9** The main shelf and compartment dividers were let into grooves in the box sides, as were the top and bottom panels. I used a combination plane, plough plane and a miniature router plane to cut these grooves, and prepare a tongue on three sides of the shelf.
- 10** The rising divider slides in a groove. However, to both help disguise its presence, and prevent it being fully removed, the top portion of its groove is prepared as a 'v', rather than square.

- 11** The divider has a tenon each end, the upper portion being 'v' shaped to match the groove in the sides. In use, the square tenon section limits the travel of the divider, as it reaches the 'v' section of the groove.

Top and bottom panels

- 12** The top and bottom panels are made by veneering over Baltic birch ply.
- 13** The 'show face' is veneered with rosewood, and luckily the plank yielded veneers just wide enough to book match across the narrow width. The reverse side was counter veneered with meranti, in an attempt to limit any warping of the panel.
- 14** Since I wished to inlay a banding between the box sides and these panels, the rebate left towards the show side was made large enough to accommodate this, rather than having to excavate it after assembly.



Box assembly

15 The box was assembled with top, bottom and all dividers in place, the fixed dividers being glued, and the rising divider having its sliding tongues and grooves waxed. Fortunately I remembered to mark on the outside where the box would later be sawn open. Starting at one end, and sliding the top and bottom panels in before tapping on the opposite end was quite a challenge, especially since one panel had cupped a little. Light use of clamping brought all the corner mitres tight.

Banding

16 Having left space for the banding, during the preparation of the panels, cutting it and planing the pieces to fit was a 'piece of cake'.
17 The mitred corners were trimmed on the shooting board, having been marked directly from the groove for length.

18 Once glued in, the banding can be flushed to the surface with a block plane and card scraper.

Opening the box

19 Having already installed the internal dividers, it was essential to saw the box open in the right place. Because the hinged side will open 180°, the cut should start through its external centre line. The saw cut must proceed at the correct angle to leave the compartments as designed and pass through the mitred sections of the corner joints.

20 With only a little wiggle room to play with, this cut was the most stressful point in the project. Thankfully it turned out okay.

21 The saw cut wasn't particularly clean, but patient planing around the opening eventually smoothed the edges off, and allowed the two halves to be closed without any gaps.



Hinges and lock

- 22** A box like this deserves good hardware, and I turned to Brusso and Niche Locks to supply the necessary. The hinges are designed to be installed using a router, but of course I chose to break out a hand drill and chisels: to be honest, I was far more comfortable trusting my gentle hands over the destructive potential of a router bit spinning at 20,000rpm.
- 23** The lock and latch plate were then mortised for, again by hand, and a key hole drilled and filed.

Writing surface supports

- 24** Initially I had intended on installing two simple rosewood rails into the sides of the box to support the writing surface, but having made the holly banding earlier, I was inspired to design something a little more elaborate. A few minutes with a cornflakes packet, scissors and scalpel, and I had a pattern to my liking. It took a fair bit longer, with drill, fretsaw and files, to make the final supports.

Writing surface

- 25** The writing surface is made of two sections, each having an MDF core, wrapped on three sides by solid rosewood, mitred at the corners. The sizes were all taken directly from the assembled box, allowing for the thickness of a single sheet of paper on the three rosewood edges: this should allow for any moisture effects, and for the angled opening once they were installed. The two sections rest on their supports when the box is open to provide the flat slope. In order for them to behave as the box is closed, and to allow for access to the lower compartments, they need to be hinged.
- 26** Calico was glued to the open sections and to the hinged edge of the box, providing a very effective hinge. To conceal the white calico from the outside of the box, it was coloured black with a permanent marker.
- 27** On top of the calico, a custom leather skiver was glued and trimmed to the rosewood edges.



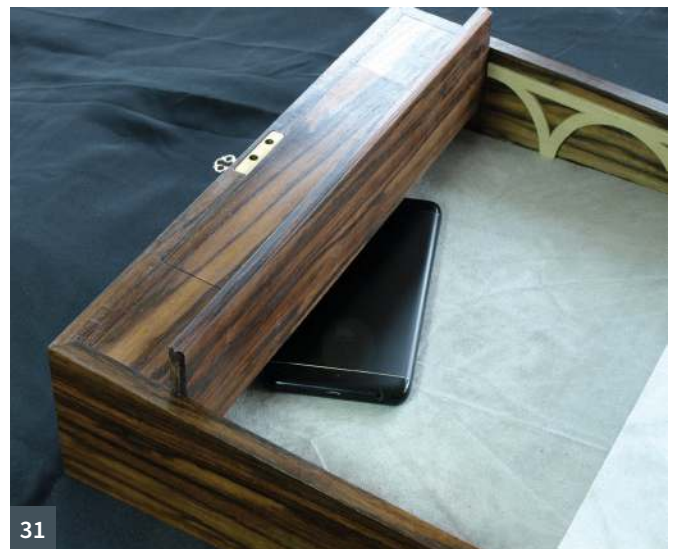
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Compartment lids

28 I felt that the three top compartments needed lids. Due to the box's compact dimensions, these lids could take up significant space, so I omitted knobs and cut the lids from a single, 3mm-thick piece of rosewood, maintaining a grain match across them. How then could the lids be lifted? The solution was a small rare earth magnet glued in the centre of each lid, within a small alignment piece. A small loose knob, with a complementary magnet was made, which could lift any lid as required.

Finishing

29 The inside of the box received a couple of coats of shellac for protection. The outside had several coats of shellac. The top and bottom initially being filled; rubbing with pumice powder and shellac to produce a glass smooth surface.

30 A baize-lined pen tray was fitted into the central compartment to ease extraction of pens or tablet styluses.

31 The large surfaces inside were faced with baize to protect tablets and the like.

In conclusion

There was a lot of work in building this small box, but it's a great piece

to show to potential customers, being light and easily transportable. Whether I get to keep it for this will depend on if my wife commandeers it – I can hardly refuse her, after all the tea and biscuits she kept me fuelled up with.



BANDSAW MASTER CLASS

Alan Holtham's essential guide
to the versatile bandsaw



The bandsaw is without doubt the most useful machine in any woodworking shop, simply because it can cope with such a sheer variety of work. But although it is a relatively simple tool in both design and use, there are some important points to look out for if you are thinking of buying one or are struggling with using yours.

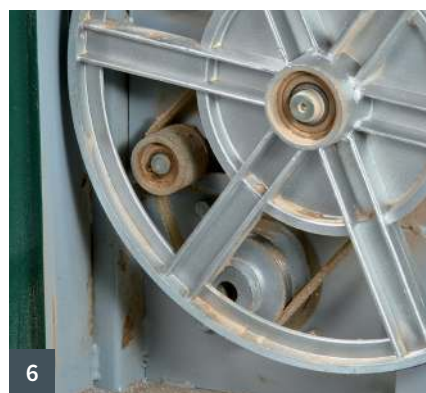
One of the bandsaw's best features is its relative safety, because all the reaction forces generated by the blade are pushing downwards onto the table and there is little chance of the dangerous kickbacks associated with, say, a circular saw. It is also much quieter, which helps to inspire confidence.

The other big feature is its massive depth of cut, with even a modestly priced machine cutting through 150mm material; you would need an impressive and expensive machine to cut this depth with any other type of saw.

For serious cutting, a two-wheeled machine with large-diameter wheels is essential. These bigger wheels can accommodate thicker gauge blades that will cut true against the fence and will not break. However, thicker blades require more tension, so the overall construction of the machine must be heavier and therefore more expensive. Also, the bigger the wheel diameter, the bigger the machine throat will be.

What to look for

Use as a determining factor the maximum depth of cut you think you will need, but always add a bit on to give yourself some spare capacity. Remember that the distance under the guides is only the theoretical depth of cut and may not actually be attainable in some timbers.



1 The comparative quiet and safety of the bandsaw soon inspires confidence **2** Look for a two-wheeled machine with large-diameter wheels **3** Depth of cut will influence your purchasing decision and a bit more than you think you need is the way to go **4** Look for a machine that will take a comprehensive range of blade widths **5** You'll need a method of balancing the wheels **6** With dual-speed machines you get a slower option for cutting hard timbers **7** You'll need a fence that locks solidly and doesn't distort **8** Mitre guides are only good for crosscutting or incorporating into a homemade jig

PHOTOGRAPHS BY ALAN HOLTAM

BLADE SIZE

What you can do with a bandsaw is also determined by the size of blade it will take, so you will need a machine that will take a range of blade widths from 6mm to 16mm, or even up to 25mm if you anticipate doing a lot of deep ripping.

WHEEL QUALITY

Although the blade is a vital factor, the performance of the bandsaw also relies on the quality of the wheels. For smooth, accurate cutting these must be running true in all planes and should have some provision for balancing, which is usually carried out by drilling or adding weights. It is impossible to over-emphasise the quality of the wheels, so do look carefully at their construction. If the wheels are out of true, the tension varies continuously as the blade rotates, setting up a vibration that shows up in the quality of the cut.

MOTOR POWER

Because a bandsaw blade generates only a small amount of friction,

motor power is generally far less than that of a sawbench. For a 150mm depth of cut you need a motor size of about 550W; anything bigger is a bonus, but will be reflected in the cutting speed in thick timber.

Single-speed machines run with a blade speed around 2,500 feet per minute, which is fine for most woodcutting jobs. Machines with two speeds are still only meant for woodcutting, usually offering the slower option for very hard timbers.

FENCE

The bandsaw is ideal for ripping thick material as it is quiet and generates very little waste, but for this it does need a good fence for the cut to be accurate. It must lock solidly in place without moving as you tighten up, and shouldn't distort unduly when the unsupported end is pressed.

MITRE GUIDE

A mitre guide is useful but not essential. Accurate mitre cutting is not possible on a bandsaw and the guides are only useful for crosscutting small pieces or for incorporating into homemade jigs.

Successful setting up

Five operations must be carried out every time you change the width of a blade, and they should also all be checked whenever you change a blade for one of the same width. The adjustments are quite simple but must be carried out in the following order:

A Set the blade tension **B** Adjust the tracking **C** Set up the thrust bearing **D** Align the side guides front to back **E** Align the side guides side to side



9 The first thing to do is to distribute the tension evenly **10** Some people check blade deflection by pushing sideways on the blade, but that is very subjective **11** The tensioning spring cushions the rotating wheel **12** To get the blade running where you want it on the tyre, track it in the centre



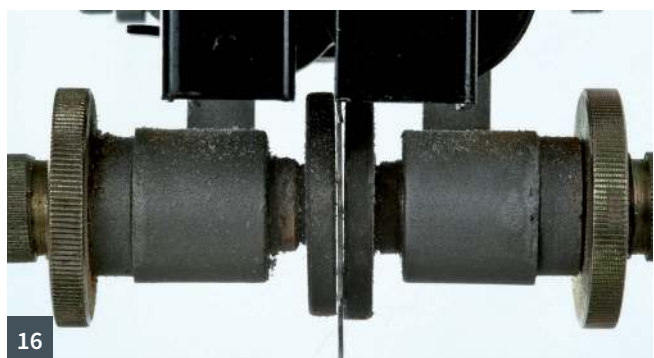
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13 A 1mm gap is ideal between thrust bearing and blade **14** Adjust the side guides for each different blade width... **15** ... because if you don't, the blade may move back between the guides with resultant blade ruination **16** When aligning the guide blocks side to side you're after the clearance of a piece of paper

TENSION

While some tension is necessary to give the thin blade its rigidity – what engineers call beam strength – tension is not that critical and people who are struggling with it are usually trying to get a wayward blade to cut straight. Winding up the tension will have no effect and if a blade does not cut straight there is only one remedy: change it for one that does.

Start a new setup by moving all the guides well away from the blade, both above and below the table. Slip on the blade, centre it on the wheels and then gradually wind up the top wheel until the blade starts to become tight, rotating the wheel slowly by hand as you do so to distribute the tension evenly.

Some people check the amount of deflection by pushing sideways on the blade but this is subjective. When trying to gauge the correct tension don't rely on the tension indicator if your machine has one because it can be unreliable; you will soon get an instinctive feel for the correct tension.

You need enough to stretch the blade taut so that it doesn't slip on the wheels, but not a lot more. If blades start fatiguing and breaking well before they are blunt, you may be over tightening, which will gain nothing apart from crushing the tensioning spring in the top wheel adjustment. This spring is vital to provide a cushioning movement for the wheel as it rotates, ensuring smooth running and prolonging blade life.

TRACKING

This entails tilting the top wheel backwards and forwards to get the blade running where you want it on the tyre. I prefer to track it in the centre as it makes the blades more stable, particularly if you start backtracking. The blade may or may not run in the same position on the lower wheel but this is unimportant. Tracking

adjustments should always be carried out as the wheels are being spun by hand.

To move the blade forwards on the wheel, tilt the wheel forwards by slackening via the tracking knob, and vice versa. The adjustment is very fine so go steady and spin the wheels a fair bit after each alteration to allow the blade time to move before you alter it again. An over-tightened blade may be unresponsive.

THRUST BEARINGS

Once the blade is tensioned and tracked correctly, set the back-thrust rollers. These resist the backward pressure of the blade during a cut. Set the bearing so that it is just clear of the blade when it is free running; a gap of about 1mm is ideal.

Keep these bearings in good condition as they will help to prolong blade life. At full cutting speed they will do a lot of work and eventually wear out, so be prepared to replace them occasionally. Don't forget that the guide system is usually repeated under the table as well, so both sets must be adjusted together.

SIDE GUIDES

Side guides keep the blade running true and stop it twisting during the cut. For maximum effect they should be set to provide support right up to the gullet of the blade teeth, so will have to be adjusted for each different blade width. If you don't reset them the blade may move back between the guides, knocking all the set off and ruining the blade in seconds.

GUIDE BLOCKS

Plain blocks or bearings, these must be moved in until they are again just clear of the blade. The thickness of a piece of paper is about the right clearance. Line up top and bottom guides vertically too.



17 Blade width is more important than its thickness **18** The fewer the teeth, the coarser the cut will be **19** Tooth pattern is the determinant for cutting speed and quality

Blade choice

Newcomers can be bewildered by the sheer variety of blades, but with careful thought about the type of work you anticipate doing, you can get away with quite a small selection. A number of variables dictate your final choice, such as:

- Straightness of cut
- Speed of cut
- Quality of finished surface
- Depth of cut
- Grain orientation
- Hardness of material

If you anticipate doing a lot of a particular type of work it is always better to change to the proper blade for the job. How you actually choose it can be simplified into three categories: width, tooth pattern and tooth pitch.

BLADE WIDTH

The blade width, as opposed to the thickness, is the single most important factor. If you are cutting curves the radius of the smallest curve will determine the most suitable width. If you are cutting straight then choose the widest possible blade your machine will take.

TOOTH PATTERN

This really determines how quickly you want to cut and the quality of the resulting surface. For general-purpose wood cutting the skip-tooth pattern has always been accepted as the norm, but a new generation of blades offers more aggressive teeth profiles and thinner gauges to minimise kerf wastage.

TOOTH PITCH

This is the spacing of the teeth, normally expressed as teeth per inch (tpi); basically, the fewer the teeth the coarser and rougher the cut.

Blade maintenance tips

- Once you have your new blade installed and tensioned properly, a good tip for easy running is to smooth off the back and slightly radius the corners; this also minimises burn lines, particularly with narrower blades. Use a diamond lap applied gently to the back of the blade as it's spinning under power.
- A clogged blade will stop cutting or cut off line. Resist the temptation to give it a good wire brushing; this will just ruin the sharpness. Instead take off the blade, fold it up and spray with oven cleaner; this softens the resin, which either dissolves or can be wiped off.
- It is often said that a bandsaw cannot cut accurately, particularly against the fence, but if set up properly with a decent blade, you should be able to rip veneers in thick hardwood with ease.



20 Use a diamond lap on the back of the blade as it spins under power **21** Trouble with the blade? Take it off, fold it up and spray it with oven cleaner
22 Set up your bandsaw, fit a decent blade and veneers can be produced with ease from thick hardwood

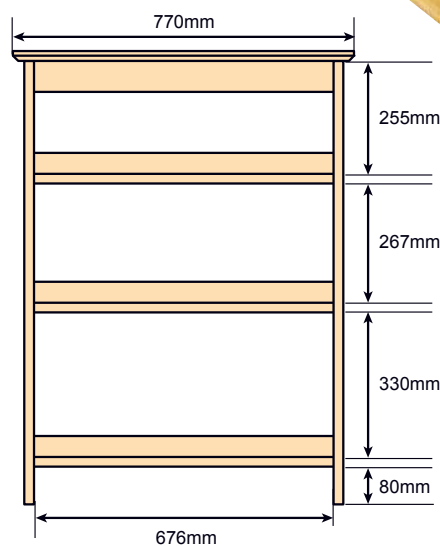
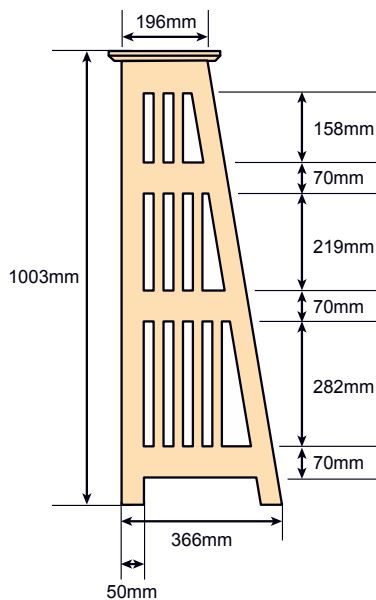
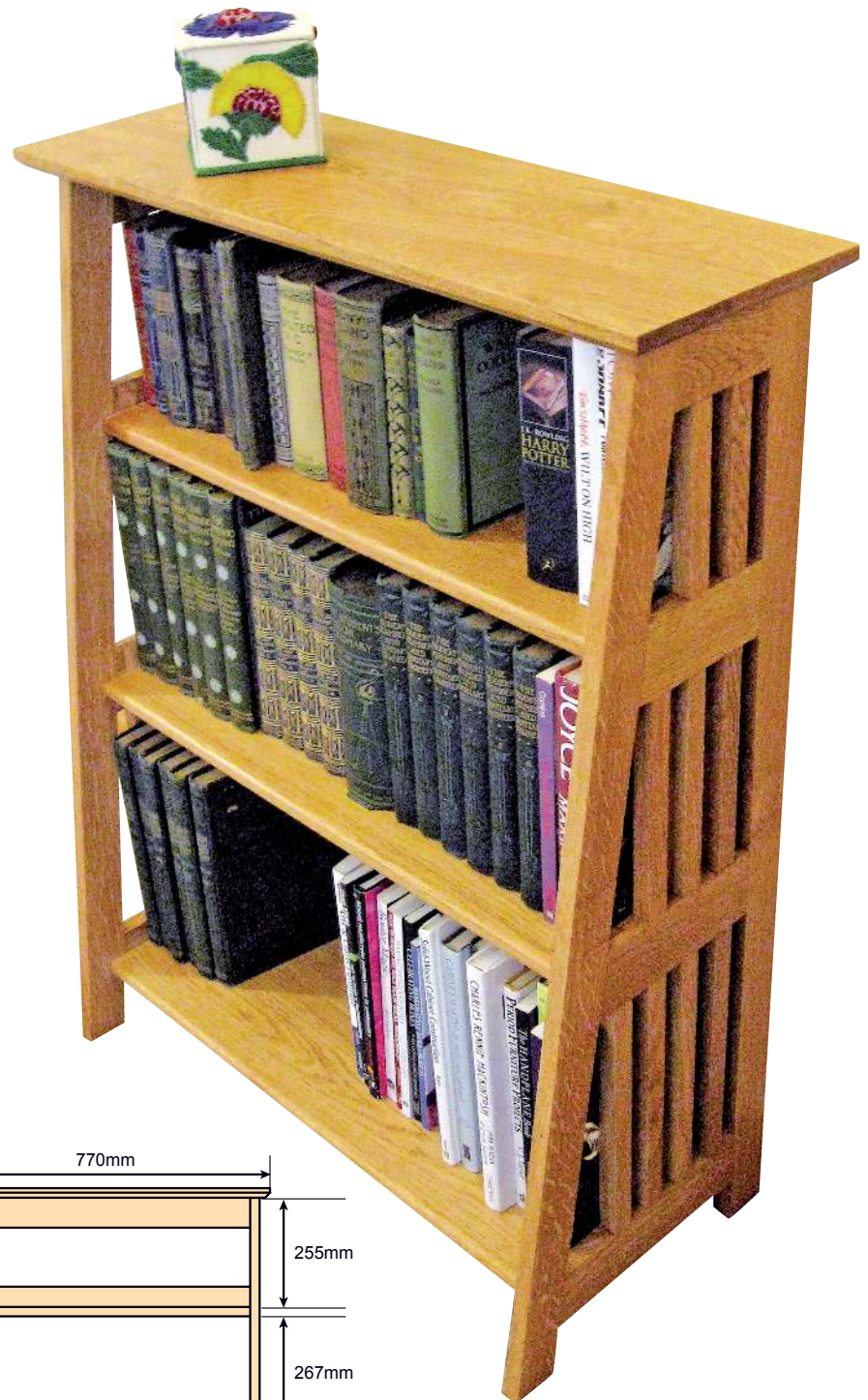
Arts & Crafts bookcase

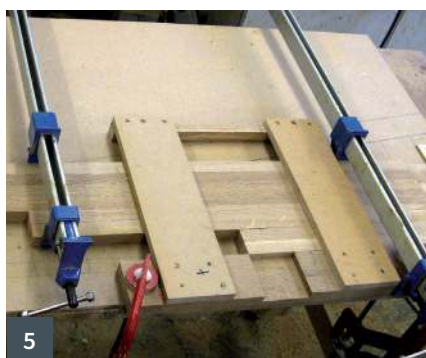
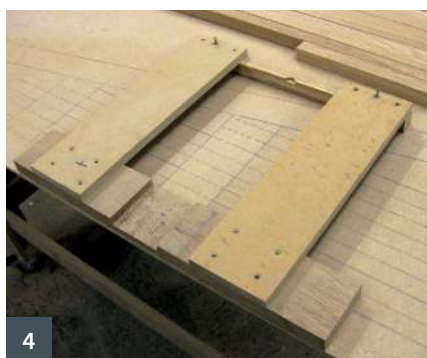
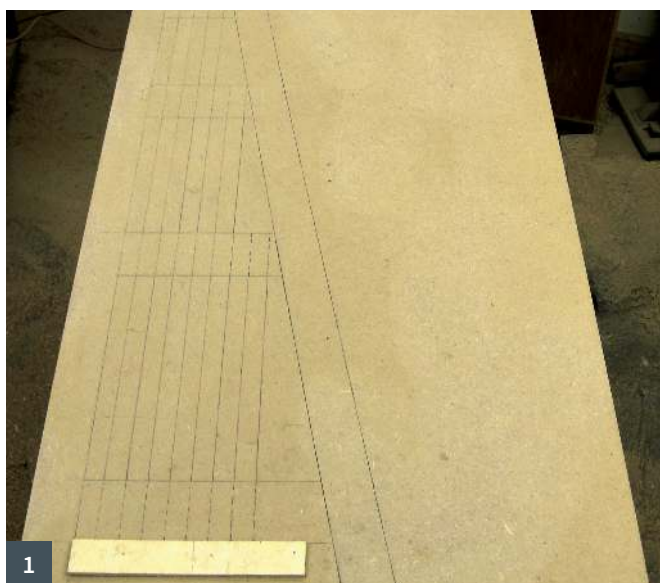
Storage solutions don't have to be plain, as Paul Davies shows with this smartly designed bookcase

I had recently finished refurbishing a bedroom in our Yorkshire farmhouse, and decided to build a pair of small open bookcases to keep a selection of bedtime reading tidy and convenient. They were to blend in with the existing furniture and fittings, which were all made from European oak in an Arts & Crafts style.

YOU WILL NEED

- European oak
- Plywood
- MDF
- Router/table
- Circular saw (preferably with sliding table/guide fence)
- Woodglue
- Biscuits
- Clamps
- Straightedge
- Pocket screws
- Sandpaper (180, 240 and 320 grit)
- Liberon Finishing Oil
- White spirit
- Beeswax





PHOTOGRAPHS BY PAUL DAVIES

Preparations

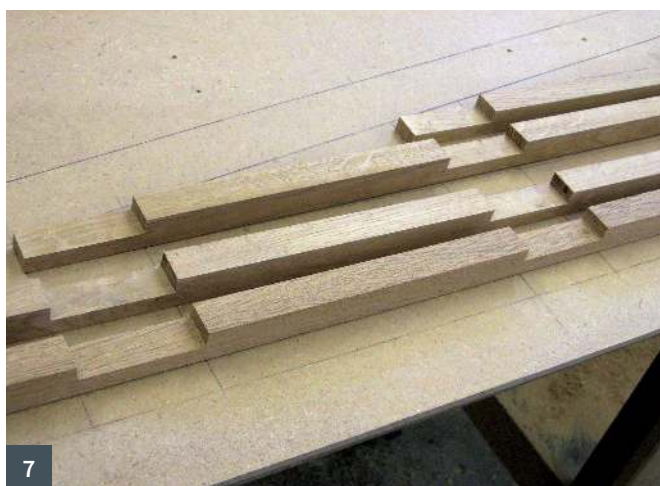
- 1 For an effective and quick cutting reference, I drew up the plans as an MDF template. From the cutting list, 25mm rough sawn European oak was roughed out for the project. As my stock was only about 160mm wide, glue-ups had to be prepared for the shelves and top, prior to final planing to 22mm. The stock for the vertical slats was then planed to 22mm square.

Making the end panels

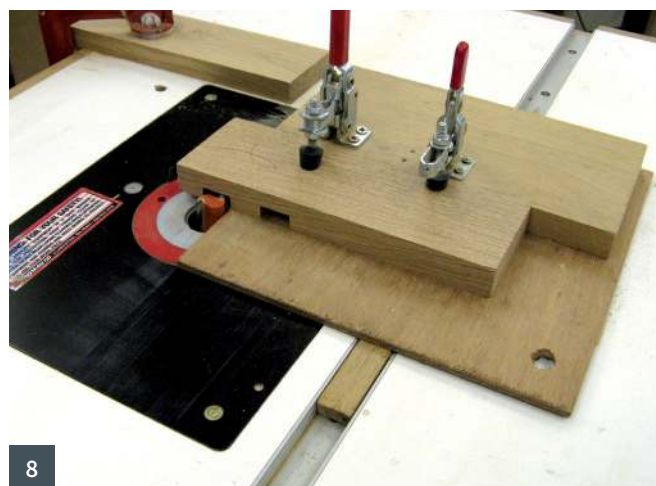
- 2 By reference to the pattern, the vertical slats were then cut accurately to length.
- 3 Each of the cross rails was squared at one end, and left about 50mm over length for later trimming at an angle. For the same reason, the front and rear vertical members were left over length.

The slats

- 4 To rout the half-lap joints in the vertical slats, a very simple router jig was made, using two pieces of excess 22mm stock from the project and two strips of 6mm MDF. The MDF acts as a fence for the router.
- 5 The slats needed to be clamped down firmly into the jig.
- 6 I used an 18mm straight cutting bit in the router, and, having screwed one of the MDF strips into position, the other strip was clamped and adjusted until the router ploughed a groove in the front member of the jig exactly 70mm wide, so that a cross rail would just slot in the groove. Having achieved this, the second MDF strip was screwed down. A plywood end stop was tacked onto the pattern for registration purposes, and I bundled together all the vertical slats for both end panels, so that they would all be routed at the same time.



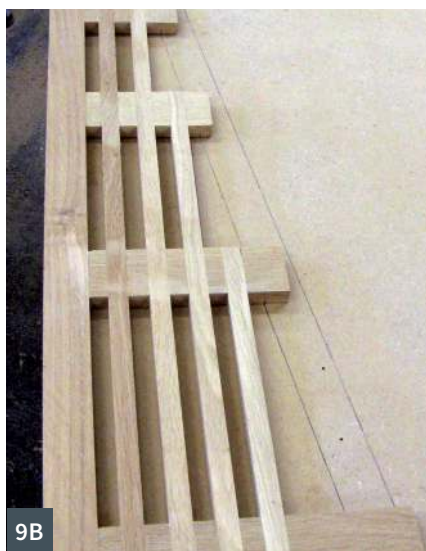
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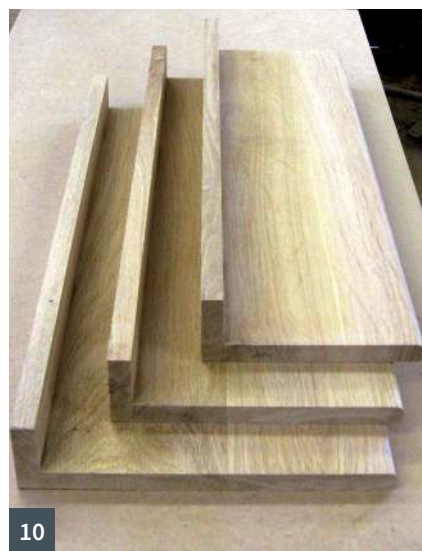
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9A



9B



10

- 7** With all the slats in place, the jig was clamped to the template exactly in line with one of the cross rails, and the rear of the jig screwed firmly to the pattern. Two passes were required to excavate the slats accurately down to 11mm. Without moving the slats, this procedure was repeated to produce the four joints for each end panel.

The rails

- 8** With the 22mm bit mounted in my homemade router table, a tenoning carriage sliding in the mitre track in the table top was used to cut the half-lap slots in the cross rails. A test piece was used, and the router bit cut through the oak to the required depth of 11mm in one pass with ease, so, once set up, the job proceeded quite rapidly. Marks were transferred from the pattern onto the bottom (longest) cross rail. These marks were used to set up the router table for each cut, and a stop clamped in place to make repetitive cuts on the other cross rails without the need for measurement. The joint-making procedure worked well first time, and, on dry fitting, the slats and cross rails clicked into place. Having glued up the sub-assembly, the rear vertical member was then laid in position on the pattern, and marked out for No. 20 biscuit slots to attach it to the cross rails.

Angles

- 9** Having clamped and glued the rear stile, the sub-assembly was then placed again on the pattern, to mark out the cuts for the 10° slope on the front edge. My saw has a sliding table, and it was a simple matter to hold the assembly firmly in position on the slider, and run it through the saw, but using a circular saw with a guide fence would be just as good. Back to the template, and the front stile was marked out for biscuits, and attached as before. The offcuts from the angle cut came in very handy here for the clamping operation. Once assembly was complete, the end panels were trimmed to the finished size on the tablesaw.

The shelves

- 10** In order to give the bookcase good rigidity, each of the three shelves was made with a 70mm upstand attached at the rear with No. 20 biscuits. In addition to providing stiffness, the upstand acts as a backstop for the books. A half-round was routed on the front edge of each shelf. The shelves were attached to the inside surfaces of the end panels along each of the cross rails with biscuits. Careful marking out is essential, and a straightedge was clamped to the side panels to act as a fence for the biscuit cutter. Having cut the biscuit slots, and done a dry fit, the shelves and the inner surfaces of the end panels were thoroughly sanded, prior to final assembly.



11



12

Assembly

11 Strategically placed pocket screws in the side panels and back rail were to be used to attach the top, and a pocket hole jig was used to cut the holes prior to assembly. With everything sitting nice and square on a flat surface, the clamps were left on overnight for the PVA to cure. The top was cut with a 25mm overhang all round, and the underside routed with a 45° chamfer, to lighten the appearance. After sanding the outside surfaces of the end panels, and the underside of the top, it was attached using panhead screws in the pocket holes cut earlier.

Finishing

12 All accessible surfaces were sanded down to 180 grit, and any dust removed with a vacuum clean and tack cloth. My favourite method of finishing oak is to use Liberon Finishing Oil. The first application is diluted 50% with white spirit. I find that the white spirit gives excellent penetration, and carries the oil deep into the timber. It is applied liberally with a brush, left for 10 minutes and all the excess wiped off with a cotton rag. The furniture is left overnight for the oil to harden, and then thoroughly sanded to 240 grit. Any blemishes or stray glue deposits may need to be removed with a scrap of 180 grit paper. After vacuuming and wiping down again, it is ready for the

second application, which is oil diluted with 33% white spirit, and the whole brushing, wiping and sanding procedure repeated, this time with 320 grit paper, or foam-backed fine grade sanding sheets. Neat oil is used for the third coat.

13 Subsequent coats are just wiped on with a clean cloth, until the desired finish is obtained. After leaving for a couple of days to harden, the furniture is then waxed and buffed with beeswax polish.



13

Double-ended spoons

Dave Western shares his technique for carving these unusual spoons



A couple of years ago I came across a lovely little double-ended spoon held in the collection of the extraordinary Skansen Museum in Stockholm, Sweden. The spoon itself was modest and simple with no flashy adornments, but it was nevertheless a wonderfully evocative object. Not much seemed to be known about its purpose, but it was suggested that it was probably used at a wedding celebration, perhaps for the couple to eat a first meal together. With the bowls placed so close to one another, using this spoon would certainly be romantic.

The memory of this elegant and mysterious little spoon stayed in my subconscious until I realised that a couple of exquisite little pieces of wood I had been saving, despite being too small for my regular spoons, were perfect for my version of the Swedish double-ended

spoon. I made one, which led to my making another, and that led to another, and before long I was obsessed with double-ended spoons.

In this article, I'll share the pattern and a couple of techniques for making this straightforward spoon. For those of you who are like me and just can't leave well enough alone, I have also included a couple of patterns for more complex versions, ranging from very traditional to a bit more contemporary. They are lots of fun to carve just for the sake of it, but if you happen to know anyone getting married, you can present them with a unique gift that will make their cake-eating ceremony a lot more fun and romantic than simply using plastic forks or throwing handfuls of the stuff at each other.

PHOTOGRAPHS BY DAVE WESTERN



1 Mark out the shape of the spoon **2** Blank marked and ready to cut **3** Starting to shape the bowl of the spoon **4** A curved knife or a curve-bladed gouge will help refine the inside shape **5** Abrasives help refine the surface if you are after a smooth feel **6** The difference between a tool and sanded finish

Cutting the blanks

This little spoon is at its best when made from a highly figured or grained wood – the more unusual the better. The spoons shown here were carved from a variety of tiny scraps such as plum, walnut, juniper and a couple of stunning pieces of heavily spalted maple. The pattern can easily be modified to make a longer, shorter, narrower or wider spoon, depending on the wood at hand.

Depending on the thickness of your scraps, you might opt to make a curved handle or tilted bowls. Thin wood limits your options to straighter spoons, but it is much easier to cut out and deal with. A thick block lets you play with the angles a bit more and make a spoon that has a bit more ‘movement’ and feels more vibrant in the hand.

Carving the spoon bowl

If you decide to use wood with wild or irregular grain, be aware that carving the bowls becomes more problematic. You may have to fight against rosey grain, which frequently changes direction or is prone to splitting. I make use of gouges and bent knives and proceed very cautiously. Note that the handle can become a breaking point, so ignore the urge to thin it too early in the process. I’ll often clamp the spoon to the bench if the wood is particularly troublesome.

If the wood is carving easily, I will generally revert to my bent knife and hold the spoon in my hand as I carve. Again, I watch to make sure I don’t create undue pressure on the handle section. I like to work the bowl fairly but not excessively deep. It is a hard point to judge, but there is a fine line between a bowl that is too shallow and thus looks unfinished and a bowl that has gone a touch too deep and looks a bit overworked. Alas, only experience can tell you when you are hitting that point.

As with all my spoons, I like my bowls to be silky smooth and as fairly curved as possible. If the wood is uncooperative or a bit chippy, I will often use cloth-backed abrasive to fair rough areas even. I drag the abrasive under my thumb, using the pad of my thumb to shape the abrasive to the shape of whatever section I happen to be sanding. I don’t use undue pressure and I make sure not to sand too long in one place.

Bowls can be a source of disagreement among carvers. I happen to prefer a highly finished look for mine, but other carvers are equally adamant that their surfaces remain ‘off the knife’. Although I find the look a bit ‘rustic’ for some of the spoons I make, there is no doubt that an off-the-knife finish can be brighter and perhaps more vivid than a heavily smoothed surface finish. It definitely has a unique appearance and for certain spoons is absolutely the right way to go. Photo 6 shows



7 Shaping the back 8 Sanded and finished 9 Gentle refinement of the handle

how, in the initial stages of smoothing, the brightness of a cut edge is lost. If you commit to smoothing, be sure to smooth into the finest grits and always with the grain.

Shaping the back of the spoon bowl

To shape the back of the bowl, I generally angle a 'ramp' to the tip of the bowl with a saw or large chisels. Getting rid of that material quickly makes shaping the bowl much simpler later on. With the bowl ready for cutting, I mark a series of chamfered facets, which I then go on to subdivide until the bowl approaches roundness. This method keeps some semblance of order as material is removed.

For the back of the spoon's bowl I really do love to smooth as much as possible. I like to get the sides as thin and elegant as is safely possible and I like to sand things down to a really silky finish. It's time-consuming work, but a sleek, graceful bowl is worth it.

Creating the handle

With the bowls safely carved and finished, some fun shaping can go on with the handle section. There's not much to be done except for some gentle shaping, but vigilance must be maintained and only careful pressure applied while holding and cutting. This is an area that can break easily, especially with figured woods, so be cautious.

Finishing

With the spoons completed, a bit of beeswax polish or perhaps some mineral oil and then a beeswax polish is all that is necessary if you intend to use the spoon for a wedding or ceremony. If you have a particularly spectacular piece of timber you wish to preserve, you might want to give it three or four coats of Danish oil, culminating with a 1,000 grit wet paper sanding on the last coat. Rub the spoon thoroughly dry and leave to cure before a final beeswax polish.

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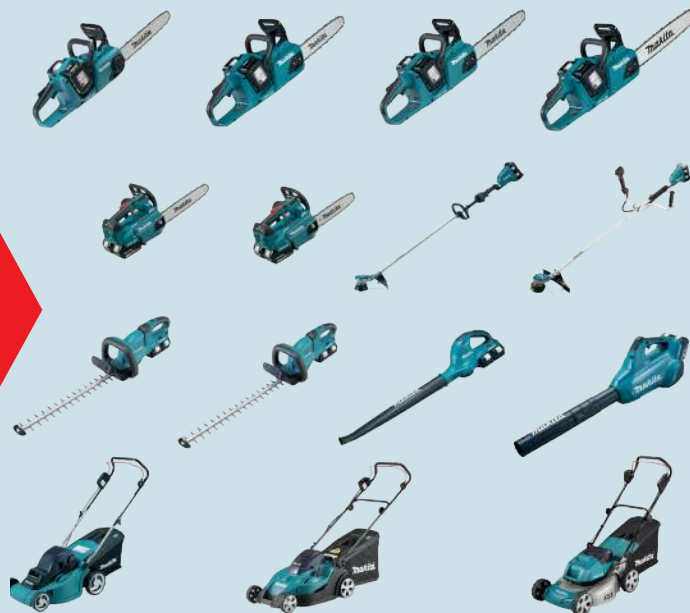


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A Hut for All Seasons

Joe Fudge of Sussex Huts shares how his love of working with wood branched out into a passion for crafting alternative living spaces

From his workshop in the heart of West Sussex, Joe Fudge casts a keen and almost paternal eye on his latest shepherd's hut creation, making sure that he's totally satisfied with the beautifully hand-crafted tiny house on wheels before the customer takes delivery. It's this attention to detail that has secured Sussex Huts a strong reputation for making alternative living spaces that mix old-world charm with solid craftsmanship.

Joe's passion for creating with wood stems from childhood, watching and helping his grandfather (also a master craftsman) work on carpentry projects. 'My grandfather worked for the National Trust,' says Joe, 'and was involved in restoration projects at Hughenden Manor and Cliveden House. He loved woodturning and making fine furniture. In fact, my mother has a grandfather clock he made and it reminds me of him every time I see it. I now fully appreciate the quality and time he must have spent making it.'

Under his grandfather's guidance, the first thing Joe remembers making as a boy was a collection of wooden eggs made from various wood offcuts found around the workshop. He recalls: 'I have fond memories of being with him in his workshop, crafting the wooden eggs as well as wood bowls, mushrooms and other small items. My grandfather would sell his huge collection of wooden bowls at craft fairs and gift them to family and friends. Although he has long passed, we still use his bowls today.'

With encouragement and instruction from his grandfather, Joe's interest in making things, particularly out of wood, flourished. After leaving school, he trained as a carpenter at Chichester College for three years and went on to work for a company who specialise in restoring period properties. During this

time, he was able to hone his skills working on old buildings using traditional techniques. Following a period of time off work due to an injury, Joe took an interest in shepherd's huts and envisaged them as cosy and characterful alternative garden living spaces. Spotting a potential gap in the market, he decided to make one for himself in his spare time.

'I spent months designing it,' Joe explains. 'I wanted to create a traditionally styled shepherd's hut with some modern comforts such as electrics and insulation. I didn't want to be too influenced by other hut makers so I visited the Weald and Downland Museum near Chichester. They have a small collection of old shepherd's huts so I was able to get a much better idea of the common sizes and layouts that would have been used in the 19th century.'



PHOTOGRAPHS COURTESY OF SUSSEX HUTS



Inspired, Joe settled upon the layout of his hut, choosing to include a small wood stove, a dining table that converts into a bed, lighting and sockets, oak windows and oak flooring. He says: 'When I finally completed the first hut after several months work, I remember feeling a little overwhelmed. I poured everything into it and I loved it more than I could imagine. I would spend most nights in it either working on the computer or simply reading a book with the fire on.'

It quickly became clear that there was a lot of interest in the prototype shepherd's hut he'd built for himself. Joe recalls: 'Someone wanted to buy my hut but I didn't want to sell it so I made him one of his own. From there, orders started coming in and Sussex Huts was born.'

Since the company was established in 2012, the interest in tiny houses as alternative living spaces has grown. As well as what Joe describes as 'doffing one's cap' to the shepherd hut's traditional farming heritage, one of the hut's key advantages is that it's fully mobile. If a customer moves home or wants a change of view, it can be easily relocated. And in most cases, planning permission (which can be a real hurdle for people wanting to expand their living accommodation) isn't required.

Joe builds the huts himself and has a small team of craftsmen and women that help. From the upholsterers that make the soft furnishings to the foundry that pour the cast-iron wheels, everyone has a real passion for quality craftsmanship. Indeed, from design to delivery, Joe is meticulous in ensuring that customers are happy.

'I invite potential customers to visit the workshop where they can spend time enjoying tea in the demo hut. They can light a fire, put their feet up and even read a few paragraphs of their favourite book to completely immerse themselves in the space,' says Joe. 'All of our

huts are made to order. I chat with the customer to find out what they need, coming up with ideas and designs that will work perfectly for them, and then create a hut to their exact specification. It's important to me that the finished product is a place that people love and call home.'

With his time-served skill and passion for high standards, Joe is a proud member of The Guild of Master Craftsmen. 'The Guild emblem is well recognised,' says Joe. 'It shows our work meets a high standard and this gives customers confidence in deciding to commission us.'

Everything about Sussex Huts speaks of quality design and carefully selected finest British materials that can withstand harsh weather conditions while still offering a traditional appearance. They use a timber called Accoya for the exterior cladding, windows and doors, which has undergone a process called acetylation. This improves durability, dimensional stability, insect resistance and the service life of coatings. Joe says: 'Our huts can last a lifetime or longer, and can be handed down through the generations.'

As word-of-mouth recommendations come in from happy customers (many whom have become firm friends) around Sussex and further afield, Joe and his team are kept busy. Each hut (depending upon specifications) can take between 6 to 12 weeks to make. So does Joe ever get tired of making huts? The answer is a definite 'no'. He says: 'Each hut is very different to the last which always makes it so interesting. We have made huts to be used for teenagers' bedrooms that included an en suite bathroom. We created a music studio for a budding drummer and built a hut to be used for the glamping industry as a self-contained space with bathroom, bedroom and kitchen. We have created numerous guest bedrooms and home offices and even a swimming pool changing room.'





Though never boring, the work can have its challenging moments and mostly where delivery is concerned. Joe recalls: 'We once delivered a hut to a remote location down a narrow country lane with low trees. We had to slowly walk alongside the delivery trailer with a long-reach chainsaw and carefully cut low branches to get the hut past. Then we had to tow the hut under its own wheels across an undulating meadow, navigating narrow gateways, fence posts, large boulders and even livestock. We eventually managed to get the hut into position and the customer was delighted. Fortunately, we have the tools to tackle most scenarios and we always make a site visit to formulate a plan prior to the hut being made and delivered.'

When Joe isn't building huts, he enjoys walks with his best friend Pippa, a black Labrador. He says: 'We spend a lot of time outdoors together. We go fishing on lakes, rivers and out to sea on the boat, and even do a spot of paddle-boarding. But even in my spare time, I enjoy working with wood and I love carving wooden spoons.'

Joe is just as passionate about making each hut as when he started. 'Physically it's hard work making a hut,' he says, 'but emotionally, I still to this day get very attached to each hut I make. It's hard to let them go. But by far the most rewarding part of making a shepherd's hut is seeing the look on the customer's face when their hut arrives on our trailer. Sometimes they cry with joy; sometimes they hug me. If it's the first time they've seen the finished hut, their first words are usually "WOW. It's magic!"'

www.sussexhuts.com

Words: **Carol Anne Strange**



Restoring an old country chair

Kevin Jan Bonner turns a dusty old attic find into a useful garden seat



Before restoration: the country chair, fresh from the attic

'Country' furniture

There is a whole family of furniture that comes under the banner 'country'. Why it should be called country is open to debate. Undoubtedly it is an old term that is buried in history, folklore and the quaint marketing of the 20th-century antiques dealer.

'Country' covers any piece of furniture that is more crude and rustic than the more fashion conscious and perhaps more refined furniture found in the town house. It often displays a vernacular quality that is rooted in simplicity and functionalism. Whatever the reason, the term has a certain logic and poetry to it and so it has stuck.

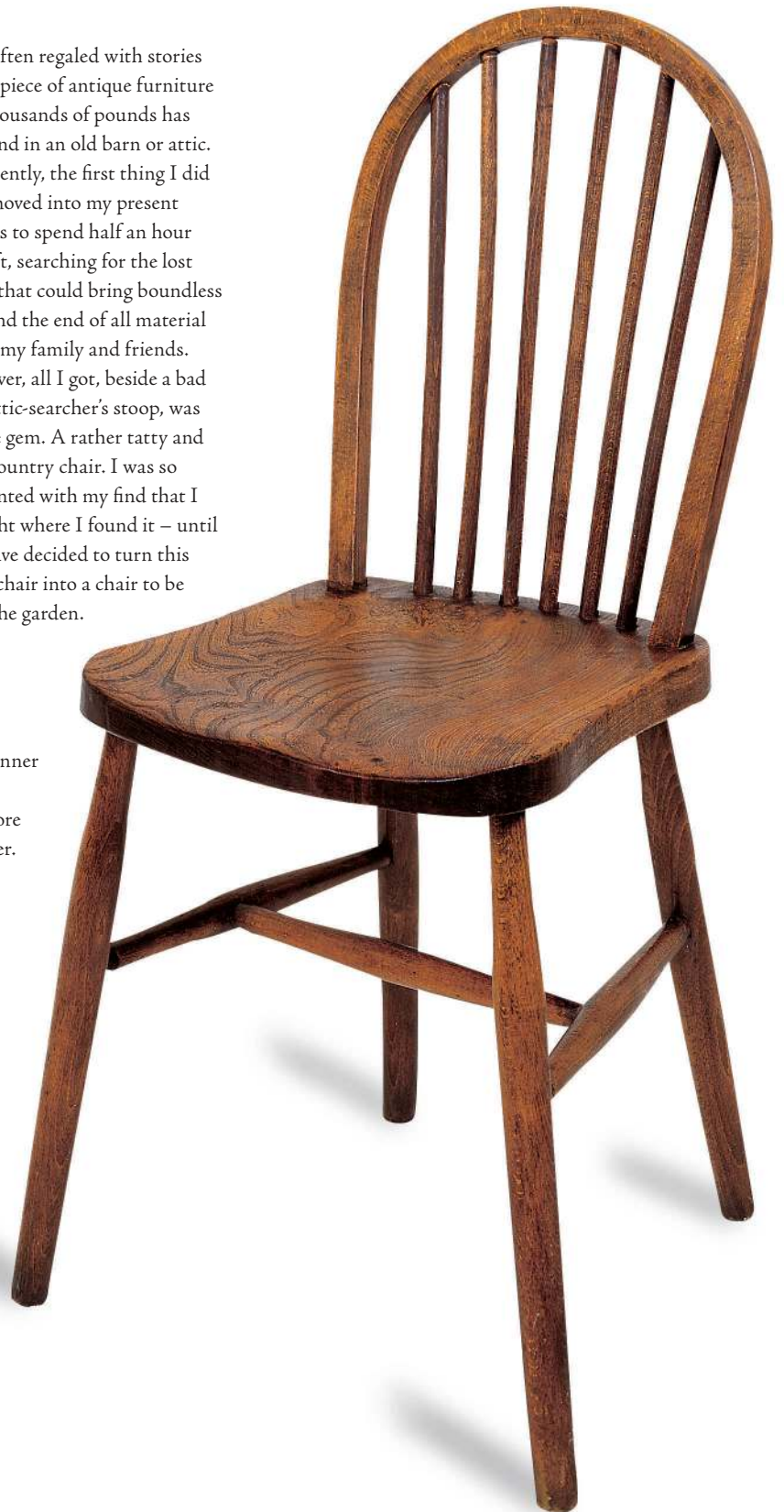
Country chairs come in many styles, the most famous being the Windsor chair. In days gone by, the craftspeople of different regions produced their own indigenous designs from locally sourced timber.

This particular chair is a very simple and common design; indeed, it is still being made to this day. The seat is made from elm and the rest of the chair from beech. The hooped back was formed by heating the beech in a steam bath until pliable, and then bending it to the required shape. The other parts of the chair – legs, stretchers and spindles – were turned on a lathe.

The finish is a dark brown, French polish type. The chair could date from any time between 1880 and 1920. Even this range is a guess, based on the condition and colour of the chair (otherwise known as the patina).

We are often regaled with stories of how a piece of antique furniture worth thousands of pounds has been found in an old barn or attic. Consequently, the first thing I did when I moved into my present home was to spend half an hour in the loft, searching for the lost treasure that could bring boundless wealth and the end of all material want for my family and friends.

However, all I got, beside a bad case of attic-searcher's stoop, was this little gem. A rather tatty and abused country chair. I was so disappointed with my find that I left it right where I found it – until now. I have decided to turn this country chair into a chair to be used in the garden.



The restoration plan

My desire is for a chair that I can use in the garden, that will withstand the rigours of hot sunshine, wet weather and oily suntan lotion. Plus, of course, the odd spilt vodka and orange (with ice please).

SO MY PLAN OF ACTION IS:

- 1 Strip with chemical stripper
- 2 Stain with oil-based stain
- 3 Finish with Danish oil

Stripping techniques

I used methylated spirit to soften the old French polish, then removed the softened finish with wire wool. Other types of finish and thicker French polishes require a more powerful stripper. For 90% of the furniture that I strip, I use a standard chemical stripper. These strippers are available from DIY stores and the stores' own brands are usually the cheapest. They may be called paint stripper, varnish remover or even hard finish remover, but essentially they are all the same.

Brush the thick gel-like liquid onto the furniture. This softens the finish, allowing its easy removal with a scraper. Finally, scrub the wood with wire wool dipped in white spirit or meths, to remove any remaining finish, and to neutralise the chemicals in the stripper.

These are the bare instructions that you will find on the back of any stripper container. The old saying, 'a little knowledge is a dangerous thing', should be added to this for what they don't tell you is how painful, mind-numbingly boring, back breaking and ultimately soul-destroying the task can be. Unless, of course, you pick up a few hard-earned tips from an experienced restorer...

The complete chair took me three hours to strip. However, it should be stated that I spread the stripping operation over a whole day. My technique is to listen to the radio while stripping, stopping at the end of each completed section for a cup of tea. Since the weather was exceptionally fine on this occasion, I also enjoyed a spot of sunbathing!

Stripping is a necessary and onerous task and has to be done well. You have to make it enjoyable, otherwise you will start to cut corners in your rush to get the job over and done with. Such measures will always show in the end product.

Before we start, it is best to expose a common mistake made by beginners. They tend to smother every part of the furniture in a thick and gluey layer of stripper, wait for 30 seconds and then start scraping the toxic gunge. Invariably, all parts of their (and their pets') anatomy becomes covered in this dripping mess, causing them to curse the day they were born. Learn from the mistakes of others – don't do it!

STRIPPING THE SEAT

Always decant the stripper into a ceramic bowl or dish and apply it with an old paintbrush. I always apply the stripper to one small section of the furniture at a time. In this case I began with half of the seat, applying only a thin coating because it was a very thin finish. A thick application (which is often suggested in the directions on the stripper container) would make the job messy, waste the stripper and make it more liable to drip all over your skin.

The stripper dissolved the finish on the seat very quickly, allowing me to scrape it off with a small, flat scraper, and transfer it to a piece of old newspaper for easy disposal.

Once the bulk of the finish, stripper and chemical gunge had been removed, I scrubbed the area with medium-grade wire wool soaked in meths. This removed any remaining residue. It is important to use protective gloves during this process, otherwise you could literally work your fingers to the bone.

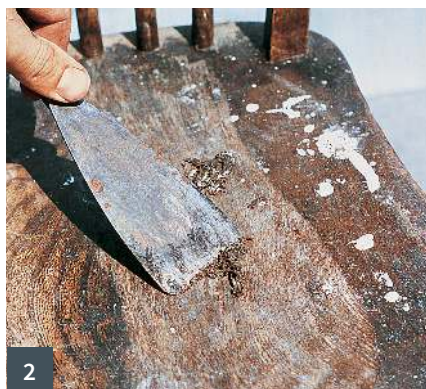
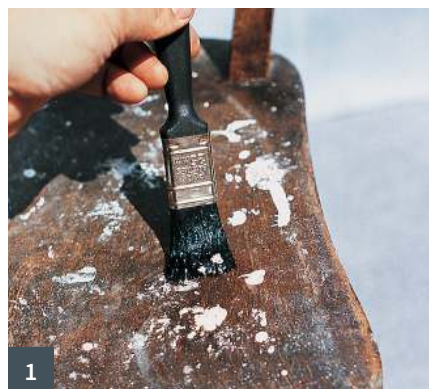
Because elm is a coarse-grained wood and the seat had some finish lodged in the grain, I continued my stripping by scrubbing the wood with a small wire brush (such as those used to clean suede shoes). This was effective for a short period of time, until the stripper stopped taking effect.

When this happens, the stripper needs to be reapplied. Give the area another very thin coating then wait until the stripper soaks in and becomes a little bit dry. How long you need to wait depends on the temperature. If you start scrubbing too soon, the wire brush will become clogged with the liquid gunge which will then just get rubbed around into other areas of the wood. The whole thing will become too messy.

Because the stripper is so thin, it will dry out quite quickly but the finish that is lodged in the grain of the wood will take on a sticky, dough-like consistency. If you start scrubbing with the wire brush at this stage, the gunge starts to clean off quite easily and cleanly.

If the wood shows a particularly coarse area of grain, as it did in this case, you may need to apply another thin coat of stripper and scrub again to remove the ingrained finish. Because my scouring action thoroughly cleaned the wood, I found it unnecessary to finish off with wire wool and meths.

I repeated the stripping on the other half of the chair seat. Between the spindles that make up the back of the chair, I resorted to scraping with a 12mm chisel and a small knife, before finishing off with the wire brush.



1 Applying a thin coating of stripper 2 Slowly scraping off the old finish 3 Stripping ingrained finish with a wire brush



4 Stripping between the spindles **5** Using wire wool to strip the spindles **6** Applying an oil stain to even up the colour of the chair **7** End grain will soak up more stain than the rest of the wood, resulting in dark patches

STRIPPING THE SPINDLES

The next part was the spindles. Beech is a particularly close-grained wood with a very smooth texture, so the spindles required a different approach from the elm seat. I coated two of the spindles and a section of the hooped back with stripper, then donned my gloves and rubbed the area with wire wool dipped in meths. Mucky, but effective, and surprisingly quick. The back took about half an hour to strip.

STRIPPING THE LEGS

The legs were the easiest; I followed the same process as I did on the spindles, using thin stripper, then wire wool and meths. This cleaned them up very quickly.

Staining

It would have been quite reasonable at this stage to give the chair a couple of coats of finish and be done with it, but the colour of the wood looked a little 'washed out' to me. This is frequently the case with old furniture. The wood didn't need a total change of colour, just a rejuvenation of its natural colour.

I decided to stain the chair with an oil stain similar to the colour

of the chair. This does not change the colour greatly, but it does even out any light patches and the resulting colour looks very natural. In fact, it should not look like it has been stained at all.

Shake the can vigorously to make sure the contents are well mixed, then pour a little stain onto a clean cloth and rub it gently into the wood. I worked methodically around the piece of furniture making sure each section was finished before moving on. I followed the same order as the stripping – seat, spindles, then legs. Turn the item upside down and view it from a number of angles to ensure that you have not missed any areas.

Staining does not take long – the whole process took just 10 minutes – but do beware of soaking the end grain with stain as this will make it a lot darker than the rest of the furniture. The end grain is a lot more absorbent than the rest of the wood and will therefore soak up a lot more of the stain, resulting in dark patches. This is a tell-tale sign that the wood has been stained by an amateur or by one who does not care for the finer points of furniture restoration. Avoid this slur on your character by leaving the end grain until the staining cloth is almost dry, then rub it hard with the cloth to impart the colour. Beware of staining your fingers; wear protective gloves.



8 Finishing the chair with Danish oil

Finishing

I used a Danish oil to finish my country chair. This is the simplest finish known to the woodworker, requiring little or no skill, but resulting in a very beautiful and practical finish. Beware! This finish is so simple and beautiful it can be addictive.

Danish oil is readily available in DIY stores, appearing under a number of different names including finishing oil, Scandinavian oil and antique oil. Danish oils are derived from natural vegetable oils. However, the additives in these oils make them much more resilient, harder wearing and, most importantly for my project, waterproof.

Pour some of the oil into a jar and use a clean brush to apply it. Allow the oil to soak in for 10 minutes, then wipe off any excess with a clean cloth. Leave to dry for four hours before applying a second coat, if required. I often apply only one coat, but this depends on the wood. In this case I applied two. I also turned the chair upside down and gave the joints and the underside of the seat a good soaking as protection for whatever the weather can throw at it. Each application of Danish oil took only five minutes. Once the oil has dried, wipe over any shiny spots with wire wool to dull them down.

So there we have it; a waterproof, sun-proof country chair. All we need now is an English summer to test it. When the oil gets worn out

or washed away with the rain, just apply another coat of Danish oil to keep it protected and looking good.

Another bonus of the oiled finish is that any spillages of suntan oil get rubbed straight into the wood – nothing wasted.

STRIPPING FURNITURE

Take care where you work. Strippers give off strong and noxious fumes so you need lots of fresh air while working. You also need lots of room so that you can walk around your project. Finally, you need good lighting. The place I favour above all others is the garden; the air is fresh, the space open and, in my case voluminous, and the lighting is unsurpassed. Failing a garden, an uncluttered shed or garage with the doors open, or a sparse room with all of the windows open will do.

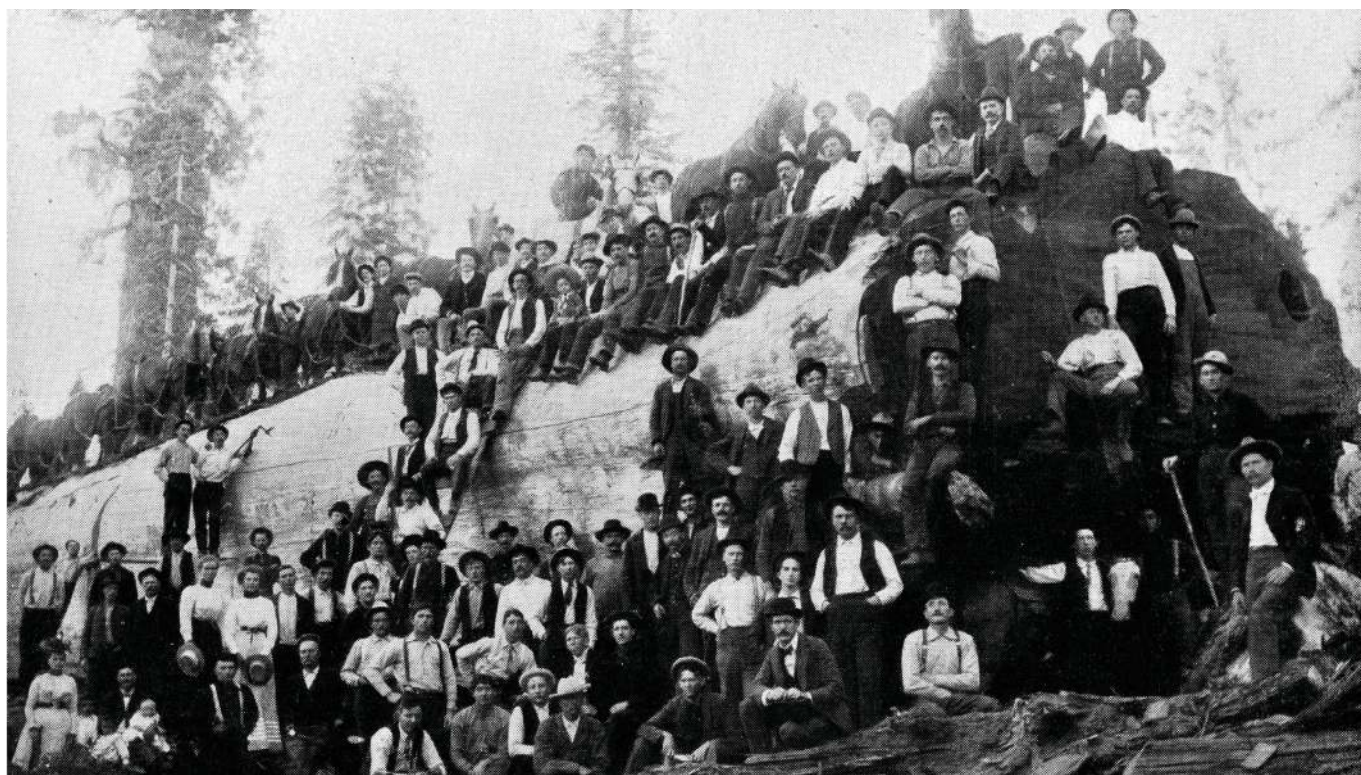
Raise the project off the ground. Unless you enjoy crawling around on your hands and knees, place your project on trestles or an old table. Stripping is hard enough – there is no need to make it more difficult.

Supply yourself with a bench or side table on which to keep all of your equipment and supplies, and keep all of your materials in one place. Otherwise, you will waste countless, frustrating hours searching for tools that have fallen in the long grass or that you have put 'somewhere safe'.



The legend of the lumberjack

‘He’s a lumberjack and he’s okay, he sleeps all night and he works all day’... we look at the history of the lumberjack



The first attested use of the word lumberjack came in an 1831 letter to the Canadian newspaper *The Cobourg Star and General Advertiser*. The author bemoaned meeting a race of mortals called ‘lumberjacks’ – ‘whom, however, I would name the Cossacks of Upper Canada, reared among the oaks and pines of the wild forest, have never been subjected to the salutary restraints of laws.’

The early pioneers

The term lumberjack is still very current, understood by anyone and everyone, almost anywhere on the planet. And yet it has its roots in the early pioneers in Canada and the USA, both countries having contiguous histories and vastly forested lands. To be strictly correct a lumberjack was a male (not female) who felled trees by manual labour alone, part of an increasingly vast army of men whose job was to bring down mature pine trees for commercial gain, a hard breed of men not just fuelled by testosterone but a massive calorie intake to give them enough energy, working in teams, successfully felling trees of huge height and girth that had been growing for hundreds, maybe thousands of years. Big axes swung and two-man saws laboured to bring forest giants crashing to the ground, their lumber to be harvested for railroad ties, construction work, paper making and fuel.

Tough conditions

During the 19th and early 20th centuries right up until 1945, the

lumberjack dominated the forest timber trade. The conditions were harsh and the pay low, but it was employment, albeit working for big enterprises making big profits. Their strength and skill in mastering the demise of valuable trees can still fill us with admiration even if the felling of giant 2,000-year-old redwoods now seems unacceptable in this environmentally conscious age.

The design of two-man saws improved with more sophisticated tooth patterns but it was still tough work that demanded good teamwork. Once a tree hit the ground, other men would cut up the largest trunks and remove branches, then move them by various means, by horse, by rolling down the slopes or even huge wheelsets, and thence to the nearest lake or river for low-friction movement in bulk and onwards to the sawmill. Steam power was used before gasoline-powered machinery became available. The arrival of railroads and highways in their turn gave more transportation options that are still used today. There were well set up logging camps with hundreds of men working in different roles – loggers, rigging men, fallers and buckers were some of the specific roles in the production chain. Women weren’t excluded, after all these early pioneers needed to be fed and watered and their needs generally seen to. There was a cookhouse with strict rules about behaviour including no talking at meal times and no alcohol allowed. The men were called to meal times by banging on a gong, usually a giant circular saw blade.

THE LAST TRUE LUMBERJACK

Legendary Maine, USA woodsman Albert Lewis 'Jigger' Johnson (1871–1935) known for his various off-the-job exploits such as catching bobcats bare-handed and drunken brawls, has been described as 'the last lumberjack'.



The forest lands of North America are vast and the timber plentiful

Typical diet

A survey of logging camps in north-west USA in the 1930s found the following items frequently served in the cookhouses: corned beef, ham, bacon, pork, roast beef, chops, steaks, hamburger, chicken, oysters, cold cuts, potatoes, barley, macaroni, boiled oats, sauerkraut, fresh and canned fruits, berries, jellies and jams, pickles, carrots, turnips, biscuits, breads, pies, cakes, doughnuts, puddings, custards, condensed or fresh milk, coffee and tea. Loggers for example needed about 8,000 calories in order to have the strength to work a 10-hour shift.

The making of a legend

The lumberjack of legend has a bushy beard, a red checked shirt, big boots and braces and stands tall, a sort of hero proto-hipster. In truth, we have reinvented the lumberjack in this image after the introduction of machine harvesting. The two-man chainsaw and its smaller derivatives have made felling much quicker and easier but don't remove the risk. It was and still is dangerous work, but for instance the introduction of machines that can move amongst trees on safer ground, to strip and fell lesser specimens has made at least part of the

job more like a straightforward production line. The bigger, taller trees, often growing on steep mountain slopes, are still the preserve of men who are prepared to take risks for the reward that felling brings. So the legend continues today, with festivals and competitions dedicated to the skill of the modern day lumberjack, thus myth, legend and reality are inextricably intertwined...

American folklore

A key figure in American folklore is one John Bunyan, the subject of many tall tales that originate in the oral tradition of North American loggers, later to be popularised by freelance writer William B Laughead in a 1916 promotional pamphlet for the Red River Lumber Company. John Bunyan is a giant of a man whose superhuman labours while accompanied by his companion, Babe the Blue Ox, have become the subject of literary compositions, musical pieces and theatre works. And thus rather like *Coca-Cola's* successful reinvention of Father Christmas as a white bearded, ruddy faced, smiley red-coated corpulent gentleman, so John Bunyan still strides tall among the vast tracts of North American forest lands, his sculpted likenesses awaiting the marvelling attentions of holiday visitors.

DID YOU KNOW?

During World War II in Great Britain the 'Lumberjill' came about as women took over many male-oriented roles in industry when men went off to fight.



PHOTOGRAPHS BY SHUTTERSTOCK, UNLESS OTHERWISE STATED

Huge statues of John Bunyan and his ever-present companion Babe the Blue Ox



It's a beard thing, buddies together



Strength, stamina and speed are the mark of typical felling competitions

Understanding Japanese saws

Michael Huntley looks at the philosophy behind Japanese tools, focusing on saws



From top to bottom: ryoba, dozuki and kataba saws

Traditional Japanese woodworking was carried out by a local shokunin or mastercraftsman. The tools that he used would have been forged by a blacksmith. Because of the cultural importance of the swordsmith the making of edged tools was a very high-status occupation.

When the wearing of swords was prohibited, many swordsmiths turned to making edged tools. Because the smiths were treated with great respect the items that they made, planes, chisels, etc., were also treated with respect. Today some smiths have the status Ningen Kokuh, which translates as Living National Treasure.

Shrine carpentry has also contributed to the maintenance of a tradition of respect. Traditional Shinto and Buddhist shrines are built of timber. Some of these shrines date back to, in our terms, pre-Norman Conquest construction. Their maintenance is perceived as a social and religious duty and the carpenters that perform this work do so with a religious attitude that percolates through to the tools and techniques that they use. Because of these two almost unique cultural approaches a strong defined tradition of woodworking has emerged.



Tools are revered by the Japanese craftsman

PHOTOGRAPHS BY MICHAEL HUNTLEY, UNLESS OTHERWISE STATED. ILLUSTRATIONS BY SIMON RIDDWAY

Nokogiri (saws)

The pullsaw has now become an accepted item in western woodworking, but how did the concept come about? One theory is that because Japanese carpenters sat on the floor to work they could not exert enough forward pressure on a saw that cuts on the push and pull stroke so they filed the teeth to cut on the pull stroke only.

Because there was no longer a need to push the saw through the work the saw blade could be made thinner. The thin blade was always in tension when in use for cutting so the kerf didn't wander and the result was a thinner, straighter cut.

Early sawyers realised the need to have specialist saws for each type

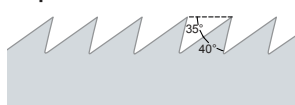
of work and timber, instituting the filing of teeth for cross- or rip-cutting.

In case you are wondering what softwoods are used, the better-quality softwood timbers for Japanese work are sugi (cedar) and hinoki (cypress).

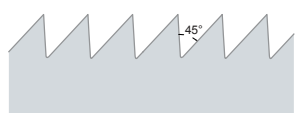
The rip saw for hardwood has a greater gullet angle than the rip saw for softwood, which has a more acute point to the teeth, but otherwise the 'chisel'-cut teeth are similar to western saws. The crosscut saw for hardwood has a less acute bevel angle.



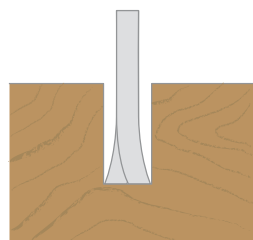
Rip teeth



For use with softwood

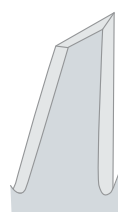


For use with hardwood

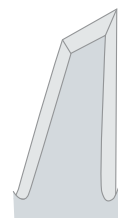


Rip teeth for softwood and hardwood are sharpened to a chisel edge with a flat bottom

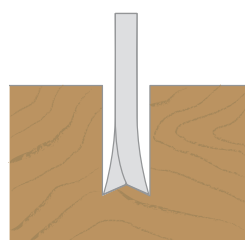
Cross-cut teeth



Hardwood tooth edge



Softwood tooth edge



Cross-cutting teeth for hardwood and softwood, also sharpened to a chisel edge with an angled bottom

Types of saw

Japanese saws are not graded according to teeth per inch (tpi). Instead teeth are sized and graded for each blade length. Ripsaws have small teeth by the heel of the saw and large teeth at the toe.

The cut is started with the teeth at the heel and once established is then 'moved' up the saw to the larger teeth.

The most useful is the ryoba, a double-edged saw with rip teeth on one side and crosscut teeth on the other. It is sometimes difficult to start a rip saw cut, but a ryoba allows you to define the start of the cut with the crosscut teeth and then turn the saw over and continue with the rip teeth. The fact that this saw has both types of teeth means that if push comes to shove you can cut all joints with this one saw.

The next most useful saw is the dozuki, a word which actually means tenon. The dozuki is used to cut very accurate shoulder lines. Its teeth are very small and it is useful to have a longer crosscut saw without a back. The dozuki will only cut to the depth of the blade below the back, so my backless crosscut is a karaba.

Some joints require angled cutting that is not at 90° to the grain line. For this a saw with ibara-me or nezumi-ba teeth is used. These teeth are part cross and part rip and give a very fast cut.

There are also some very useful keyhole saws, flush-cutting saws and convex saws for starting cuts in the middle of a panel.

All these saws will produce a very smooth cut that requires almost no

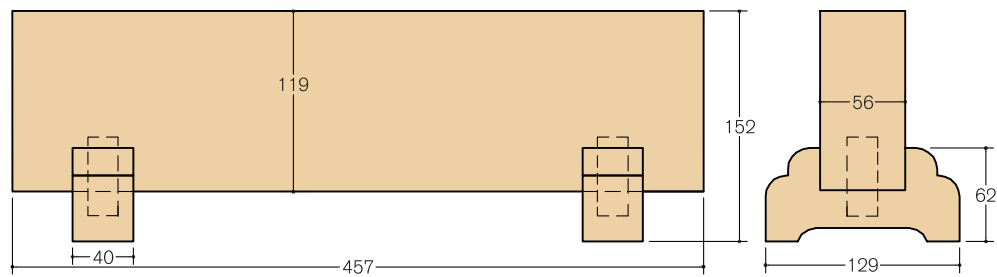
easing or shooting. The blades are replaceable but not re-sharpenable. Sharpenable saws are available but I have not seen one in the UK yet. It is hard to say how long a blade will last but I generally expect to get six months' use from mine.

Angled-cut teeth



Top: *Ibara-me* saw for softwood, and bottom, *nezumi-ba* saw for hardwood are used for cutting angle joints

Making a sawhorse



The Japanese woodworker sits on the floor and uses sawhorses to raise the timber off the ground in order to give clearance for the saw. Even if you do not sit on the ground, a pair of benchtop sawhorses like these is very useful. I have a bad back and have to avoid bending over the bench. Using these sawhorses to raise the work up protects my back and also means that I am closer to the scribe lines and therefore able to follow them better.

- 1 Prepare all the timber and then crosscut it to length. I mark all around and start the cut on the upper edge nearest to me. This allows me to watch the progress of the kerf down the side and across the board.
- 2 Make saw cuts for the slots first, then chop out with a chisel.
- 3 The feet take on a lobed design. Use dividers or a handy circular template to mark out. Divide the height into thirds or fifths to give the centre lines.
- 4 Cut the lobes on a bandsaw or suitable framesaw, then clean up and reverse the component to use as a template for the other end of the same foot and for the feet on the other horse.
- 5 Drill for pegs in the feet and crossbeams and assemble.



Completely balanced, this interior whispers ‘less is more’

PHOTOGRAPH BY ISTOCKPHOTO.COM/MARCELO SAAVEDRA

Aesthetics

The texture of wood is an important part of Japanese aesthetics. The Japanese response to wood comes from their approach to the natural world. Plants, animals and the countryside are valued. The art is in making the prepared timber appear natural and organic.

The shokunin was taught to believe that he had a disciplined relationship with the community in which he lived and worked and that he had an aesthetic relationship with his materials and finished products.

The most accessible text about the shokunin is found in Toshio Odate’s *Japanese Woodworking Tools – Their Tradition, Spirit and Use*. Odate says ‘... shokunin means not only having technical skill, but also implies an attitude and social consciousness’. Note that the title includes the word ‘spirit’. This is what is unique about the Japanese approach: the craftsman seeks to relate to the spirit of the craft.

DESIGN DISTINCTIONS

I have already mentioned the respect for materials, objects and their makers, and for the community. Respect also incorporates a sense of balance and harmony. Traditional designs are intended to demonstrate balance. That means an object or a design feature, such as decoration,

is worthy in its own right. An extreme example of this is the fact that a collector of pots may have dozens of different vessels but will only show one at a time. In order to fully appreciate that pot, it needs not to have the distraction of other pots around it. Compare that concept to the European idea of trying to put as many pots on a display shelf as you can fit on it.

This is one reason why pictures of Japanese interiors look so calm and restful. The design is complete in itself. It is neither too high, too long, too wide nor too busy. It is resolved. If the eye is led anywhere it is led where the designer wants. I am reminded of the phrase ‘Less is more’. In Japan the function of an object is not hidden under masses of ornament.

How do you describe and teach balance? A Japanese child is brought up with a sense of balance within the house and the world they experience. Major festivals emphasise the appreciation of natural beauty, such as the cherry blossom festival or the ‘marriage’ of two naturally occurring rocks that look as though they should be joined together.

Inner meaning and animism allow every object to have value. In one sense this is kitsch, but for serious objects Japanese culture acknowledges and responds to their spirit and beauty.

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ROUTED MORTISE AND TENON

If you own a router you can make mortise and tenons easily. Stuart Lawson shows how

The best way to cut a mortise is with a mortising machine. However, if you don't have the funds, your router can make a good job of a mortise fairly quickly. For tenons, a table set-up is ideally suited.

Making a mortise box

The mortise is made using the mortise box, whereas the tenon is cut on a router table. Here's how to make a mortise box that can be used again and again. As you can see, making the mortise box couldn't be simpler. The box can be any length or width, but the dimensions shown below are the most useful.



A mortise jig ready for action

CUTTING LIST

Base: 500 × 100 × 18mm

Sides x2: 500 × 100 × 18mm

CONSTRUCTION

Cut the component parts slightly oversized and then true the edges with a hand plane. Make sure that they are square and square-edged. Assemble the sides and the base and then cut some suitably sized battens as stops. It is a good idea to store useful packing with the box.

Machining a mortise

Screw the mortise box to the bench before packing up the workpiece flush with the top edge and cramping it to the box side. Position the workpiece and pin the length stops across the top of the box. Transfer the relevant workpiece markings to the mortise box, in order to rout any repeat cuts. Adjust the parallel fence to line the cutter with the markings. Set the depth to approximately 2mm more than the tenon length. Then plunge and rout in a suitable number of stages.

Tenoning

A fine height adjuster is essential since the difference between a perfectly fitting tenon or not is about 0.1–0.2mm on each tenon cheek. It is best not to rely on a mitre fence, these invariably have a certain amount of play within the guide channel. Instead use a square-ended pushboard that is run along the table's fence.

Machining a tenon

Position the fence at a distance from the cutter that equates to the length of your tenon. Add a lead-in support fence. Use a square push board behind the workpiece, which the workpiece is clamped against. Using a test piece make your first shoulder cutting pass using a ½in straight cutter, then flip the workpiece over. Mark up a test workpiece and then by trial and error, working from both faces set the height of the cutter to cut a tenon. Check the fit in a mortise with the tip of the test piece. Now you can repeat the operation on actual components. The edges of each workpiece will also need shouldering so you may need to reset the cutter height to suit whatever tenon size you need to fit the mortise.

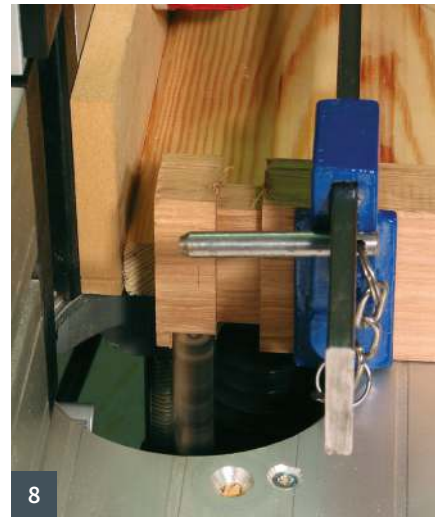


In use – note the length stops

To match the rounded ends of the mortise you will need to shape the ends of the tenon. Use a chisel to shape the roundover ends of the tenon and a dovetail saw with small teeth to cut away at the base of the waste without damaging the shoulder. The completed joint should require no more than a couple of taps with a mallet to seat properly, any more and the joint is too tight.

Making a mortise and tenon joint





1 Pack up the workpiece so that it is flush with the top of the jig **2** After cramping the workpiece to the side, position and pin length stops at 90° across the top of the box **3** Rout the mortise to depth in an appropriate number of passes **4** The completed mortise **5** The set-up for cutting tenons on a router table. The workpiece is clamped to a perfectly square support board. This assembly is run against the lead-in fence, the workpiece is re-clamped for each face **6** Making the first shoulder pass **7** Making the second pass **8** Cutting the final shoulder **9** The machining completed **10** The corners of the tenons being pared down with a chisel **11** The finished joint



Tudor-style bird box

Alan Goodsell shows that a bird box doesn't have to be bland, it can have style – Tudor style!

Tudor-style houses were originally built as a wooden frame for the structure, with the gaps between filled in with wooden sticks and plaster. The style is still popular today, but the wooden beams are now fake pieces applied on top of the surface of the walls. The idea here is to try to recreate that look with pieces of wood applied to the surface of the bird house walls. You can follow my design, or you can create your own version for other styles of Tudor beams. The beams are painted in a contrasting colour to give the effect of a Tudor house.

Making the box and roof

You can purchase a plain, ready-made bird box or make your own basic box with a pitch roof. The plans for the box and roof are shown on the opposite page.

YOU WILL NEED

- Hammer or nail gun and 19mm long nails, pins or brads
- 120 grit sandpaper (and wooden block)
- Waterproof glue
- Pencil
- Tape measure
- Combination square
- Saws
- Drill and drill bit
- Nail punch
- Clamp
- Mitre box
- Hole saw of the diameter you require
- Drill
- Vice
- Black, white and brown paint

Materials for the basic box:

SIDE WALLS

2 x plywood @ 10 x 150 x 140mm

FRONT AND BACK WALLS

2 x plywood @ 10 x 132 x 130mm

FLOOR

1 x plywood @ 10 x 132 x 132mm

Materials for the pitch roof:

FRONT AND BACK GABLES

2 x plywood @ 10 x 132 x 90mm

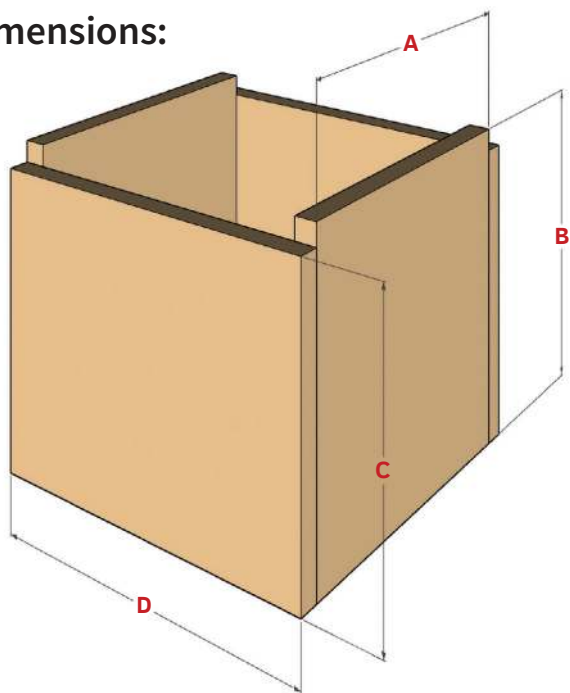
ROOF PIECE (NARROW)

1 x plywood @ 10 x 125 x 200mm

ROOF PIECE (WIDE)

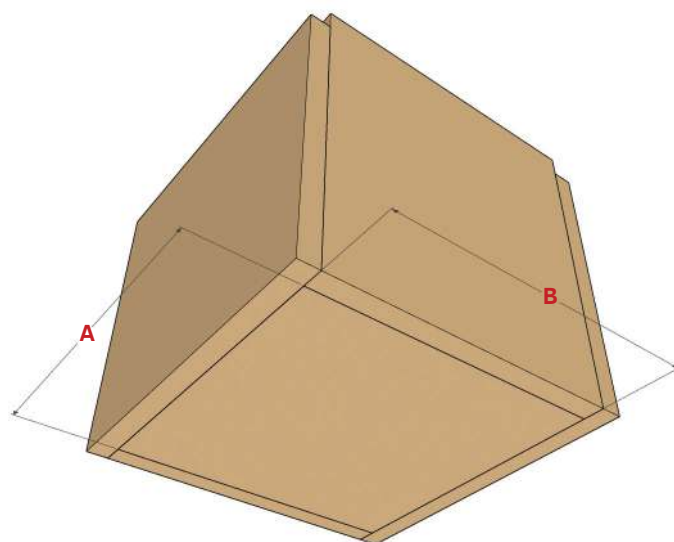
1 x plywood 10 x 136 x 200mm

Dimensions:



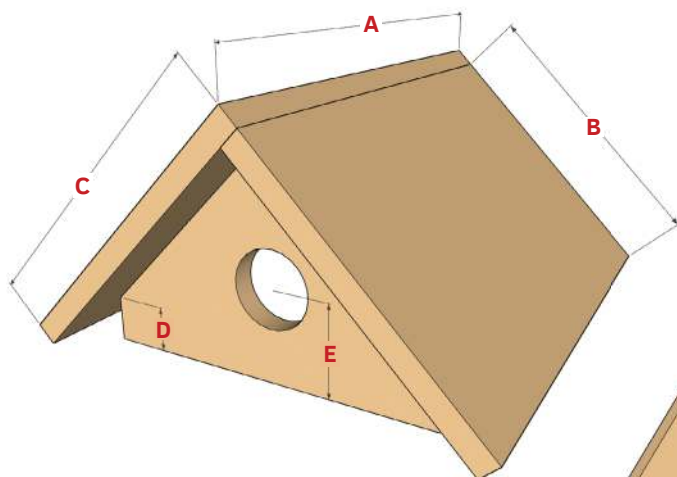
Front and side wall dimensions

- A 5¼in (132mm)
- B 5½in (140mm)
- C 5⅞in (130mm)
- D 6in (150mm)



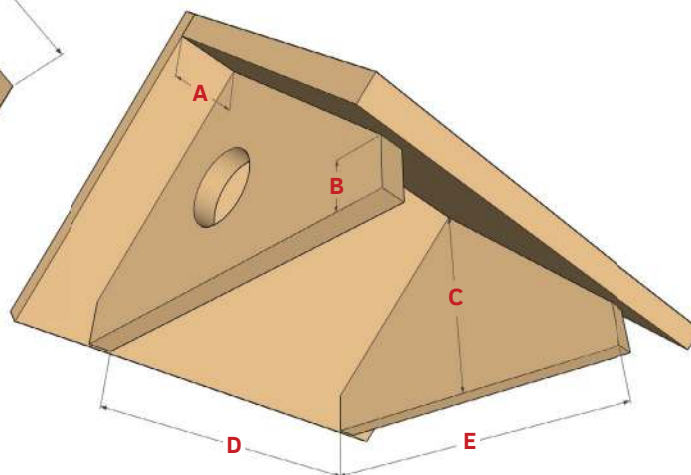
Floor dimensions

- A 5¼in (132mm)
- B 5¼in (132mm)



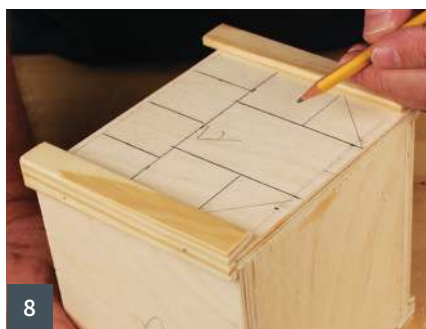
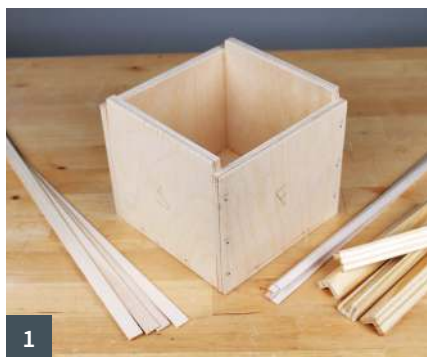
Dimensions of pitch roof from top

- A 8in (200mm)
- B 5in (125mm)
- C 5⅝in (136mm)
- D ¾in (19mm)
- E 1⅜in (35mm)



Dimensions of pitch roof from underside

- A 1in (25mm)
- B ¾in (19mm)
- C 6in (150mm)
- D 5¼in (135mm)
- E 3⅞in (96mm)



1 Wood strips and 90° corner angles are needed to create the Tudor effect **2** Mark the corner angle at the height of the box side **3** Cut and glue the corner angle then nail it in place flush with the box bottom and side top **4** Glue and nail all the corner angle pieces **5** Mark, cut and glue a strip of wood the distance between the corner angles **6** Mark the height of the inside of the door frame at 85mm high **7** Then 50mm wide in the centre of the wall. The door to be made later will be 85 x 50mm **8** Mark more lines, three vertically above the door and a couple either side of the door halfway up the frame **9** Cut the frame so that it fits between the corner angles

Making and applying the Tudor-style beams

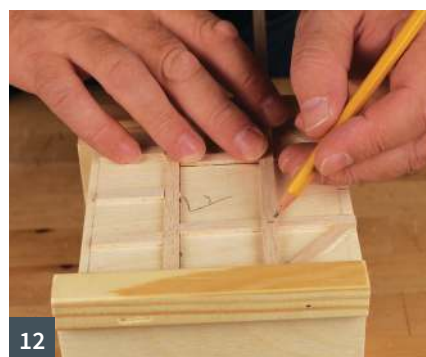
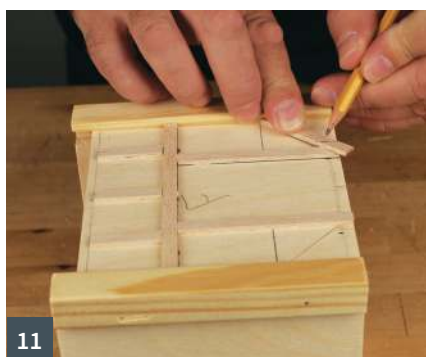
Start the beams by adding the corner moulding to all four corners of the box. Cut the pieces to length and glue and nail them in place. Use waterproof glue and shorter 15mm pins in a nail gun. Make the beams the same length as the sides of the bird house, which creates a recess that the top will locate into. Next, cut the 10mm-wide strips that will cover the join between the roof and box. Mark and cut it to length between the corner angles, then place it on the front, aligned with the top of the corner angle and draw a line across the box. Repeat this process on the back. This strip will be glued to the roof to hide the join between the roof and the box.

The first piece to apply is the 6mm-wide horizontal door frame piece. The inside of this is 85mm high and the two vertical frame pieces 50mm apart in the centre of the wall. Now cut three vertical pieces to fit between the door frame and the drawn line at the top of the box and glue them in place. Next, cut two short pieces with opposing 45° angles on their ends to fit diagonally between the corner moulding and the door frame at 45° and glue them in place. Lastly, cut and glue two pieces

horizontally on top of the angle pieces and to the door frame.

Tudor house building was not a precise science, so any unevenness in positioning of the beams will give the bird house some period charm. The side walls have a horizontal beam at the same height as the front's door header beam and three vertical pieces above it, with a wide 15mm strip horizontally placed above them. The lower part of the wall has a narrow horizontal beam at the same height as the front's mid-door piece, 50mm away from the top beam, and two vertical beams centred on the wall and at 55mm apart.

The last wall to treat is the back wall, and this has the horizontal beam placed at the same height as the front's door header beam and three short pieces placed vertically above it. These three pieces are 3mm short of the top of the wall to allow for the horizontal beam of the roof to butt up to them. A vertical beam is placed in the centre of the wall from the ground up to the horizontal beam. Two pieces are then cut with 45° ends and are placed diagonally either side of the central vertical beam.



10 Mark, cut and glue three vertical pieces in place on the top row. Mark the length of the vertical door frames between the bottom edge of the top door frame and the bottom of the box. Glue them so their inside edges are on the vertical lines **11** Mark opposing 45° angles on either ends of a short strip. Cut them and glue the strip in place. Repeat on the other side **12** Mark and cut the horizontal pieces between the corner angle and the outside of the door frame. Glue it in place and repeat on the other side **13** Cut, glue and place two frame pieces: one 38mm up and the other 50mm away from it. Cut and glue the vertical frame pieces in place on the wall at 50mm apart **14** Next, cut and glue three short strips to go vertically above the window and a horizontal strip on top of them. This lines up with the one on the front and back. Repeat the framing process on the other side of the box **15** The back of the box is similar to the front but without the door frame and with a vertical strip in the centre flanked by strips at 45° on either side **16** Place the roof on top of the box and run a line of glue along the top of the previously cut strip. This will ensure it only adheres to the roof piece **17** Place the strip on the roof piece and set down to the vertical strips on the box, cut 45° strips to go either side of the hole, then glue them in place **18** Cut one more strip to go above the hole. It has opposing 45° angles on either end. Glue and stick the strip in place

Thatched roof

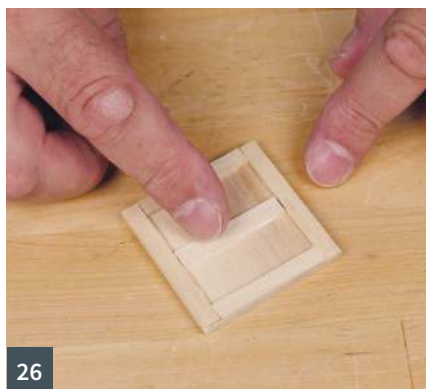
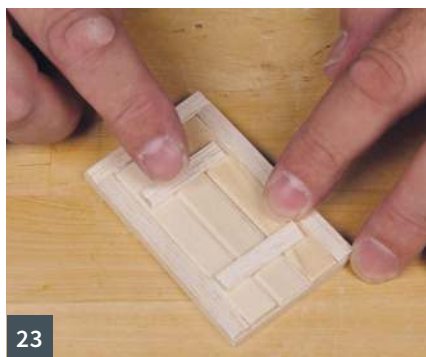
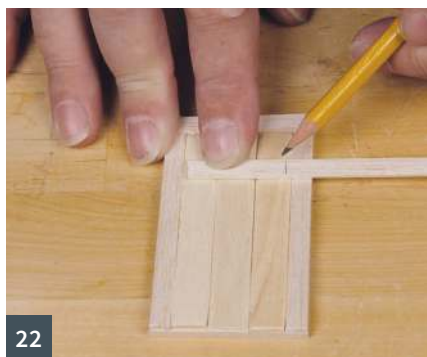
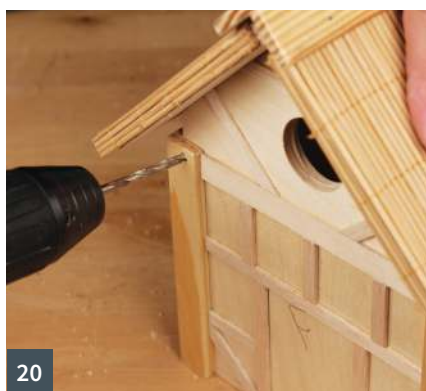
Glue and fit the horizontal beam; its length is cut at the distance between the corner pieces on the base box and it is glued on the gable end of the roof, protruding down to the line on the box to cover the join between the roof and box. On top of this, two diagonal beams will be placed, so cut a 45° angle on one end and a 90° angle on the other end. These beams will clear the hole on the gable end and look like roof supports. Finally, cut 45° angles on each end of a short beam that goes over the hole and glue that in place. Repeat this beam pattern on the rear gable, too.

When the roof is completed, you can drill holes in the front and

rear corners so that the top can be fixed to the base with screws. These screws are easily removed again at the end of the season for cleaning.

Ledge door

This door is actually inside out as the ledges would typically be on the inside of the house, but using artistic licence we have put them on the outside for extra charm. Cut two 10mm-wide ledges at 30mm long and glue them on the door, about 12mm away from the top and bottom of the door. When finished, paint or stain the door how you want it and then add some blobs of glue on the back. Now stick it in place on the wall of the bird house where you want it.



19 Repeat the process on the back **20** The drill holes where screws will hold the two pieces of the bird house together **21** The Tudor-style bird house in its bare state ready for windows and door **22** Mark and cut a 90 x 50mm backboard and cut and glue on a 6mm wider header frame. Then mark and cut two 30mm long ledges from 10mm wide strips **23** Glue them on the door about 12mm away from the top and bottom of the door **24** The plank door with ledges adds extra charm to the bird house **25** Cut a 50 x 50mm square backboard and cut and glue a frame **26** Cut and glue a centre muntin in place in the middle **27** Cut and glue two small muntins to divide the window up into four panes

Windows

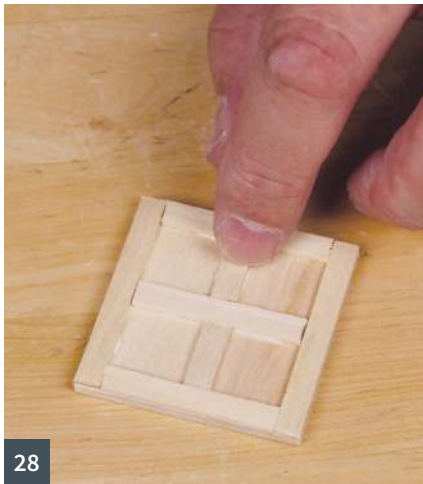
The start of the four-pane window is to cut the backboard from a sheet of the thin wood from a craft pack. Make it 50 x 50mm square. This is a size that looks in scale on the side of the bird house. Mark and cut the two vertical stiles and glue and stick them to the sides of the backboard. Now, mark, cut, glue and stick the top and bottom rails at the top and bottom of the backboard in between the stiles. Cut another horizontal rail the length of between the stiles and glue it in place halfway up the window. Now cut two short muntins (the vertical or horizontal components between glass panes) to fit vertically between the middle rail and the upper and lower rails, then glue them in place. The four-pane window is now complete.

For the ledge shutters, first cut two backboard 60mm high and 25mm wide one for each window. The vertical boards are made

from 6mm strips and have a chamfer sanded on their edges. A V-joint look is created when they are butted together. Cut four of these pieces for each shutter at 60mm long. Glue them to the backboard and they should fit across its width. If they are a bit narrow, just space them apart a little.

Paint scheme

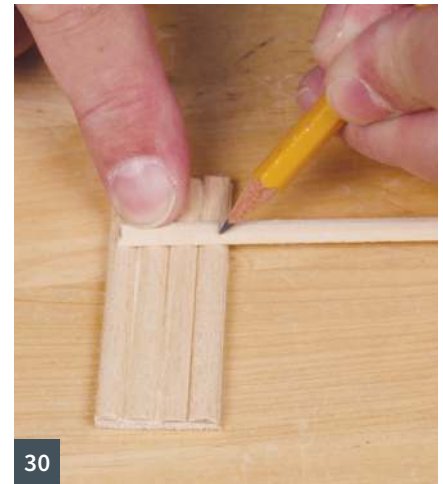
The traditional style of a Tudor home is to have black beams with white walls. Paint the bird house white, both inside and out, then paint the beams. A sharp brush with a steady hand is needed to cut the edges of the beams to the white of the background. All individual features such as windows and doors are painted a dark brown to emulate wood. The roof was painted white inside and out, apart from the black beams, and a light brown finish applied to the thatching gives it a natural look.



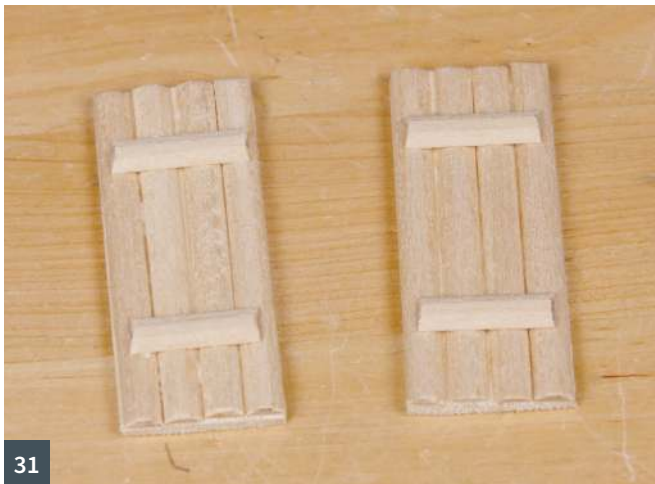
28



29



30



31



32



33



34

28 The four pane window is now complete **29** The ledge shutters each need a backboard 60 x 25mm to which four 6mm wide chamfered strip are glued **30** Two ledges are needed per shutter. Mark, cut and glue them in place **31** The finished shutters with a bevel on the ends of the ledges **32** The bird box is painted white throughout except for the thatching **33** The front elevation looks splendid after black beam painting and brown door and windows **34** The rear elevation looks pretty good too!

Measure for measure

It's time to step away from the workbench and take that all-important tea-break

The old adage 'measure twice and cut once' makes perfect sense. We all mess up our marking and measuring. But spare a thought for everyone from the Egyptians to the Romans and even into the present day. There have been so many ways to measure and so many ways to get it wrong. For example in Switzerland in 1838 there were no less than 37 regional variations of 'the foot'. No small wonder that the French introduced metrication back in 1795 in Paris but that exercise didn't go particularly well – all the different guilds in different districts had their own measures, so the changeover was massively difficult. Even today we cannot agree around the globe about how to measure weight, length and quantity, etc. On the railways they use 'chains' as a unit of measurement (because chain doesn't stretch!). If you buy a 12.7mm straight router cutter, it has a ½inch shank – it's exactly the same, a metric front end and an imperial back end... So don't beat yourself up next time you screw up, it's a very confused world after all!



WORDSEARCH

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Countersink	Hardboard	Mitre
Drawer	Inlay	

R E I I V L J L F Y C U G G N
J E R P U E F R Z P O T P X L
O K F T W I E Q E X U Q A O L
E E Z M I K N X Z C N E L E R
N R Z C A M C A C E T G X Y R
Y A L N I H E L H Z E B Z O E
M P T E U H C A A D R L C H T
O T T B X R R H C A S I R Q N
B Q N C E D E T A N I M A L I
B X A W B V Y Y H B N M G Q O
N U A O H F E U U U K R H E J
K R A D F V H L E F A W N W D
D R E O Y U V R M I P I R G E
D J S W I W K M N O B I O J B
N W B K M E M B O S S Z T G I

SUDOKU

Sudoku is a great activity to sharpen the mind.
The object of Sudoku is to fill in the empty spaces of a 9x9 grid with numbers 1-9 in such a manner that every row, every column and every 3x3 box contains all numbers 1 through 9.

		1		9				5
				7		1	9	
		2			5	8		
7	2	9				5	6	
			5		9			
	3	5				9	4	8
		8	9			2		
	1	4		5				
5				1		4		



A classic collection

Whether it's building structures or building a successful brand, Andrew Guppy of The Classic Barn Company shares some of the secrets of his success

The Classic Barn Company creates unique, exquisitely crafted oak-framed garages and barns. Each frame is made from an impressive cross section of oak, a reliable, durable and strong timber – which maintains its beauty as it ages. Traditional mortise and tenon joints, knee braces and hand-curved beams are deployed throughout too, with each garage door being finished off with rows of traditional rosehead nails. 'We offer an array of modular, structurally approved designs with bespoke options, both small and large,' says Andrew Guppy, explaining that garages can have added log stores, cat-slides, doorways, loft storage and much more to tailor personal needs.

Regardless of an individual's requirements, every one of the classic oak frames is created and installed by a talented team of craftsmen, who devote great care to the task. 'Our service begins from the moment we send a potential client our free creative brochure. It's packed with details and ideas, and people are able to select one of the frames and get a feel for all the finishing options available.'

The Classic Extrawide™ range of oak-framed garages offer additional space, and are proving popular with owners of large family cars, SUVs

and 4x4s. For anyone wishing to add a room or two into their oak garaging, there is also a selection of Classic Hideaway frames that allow for accommodation up a staircase. If you want a thatched roof, perhaps to match that of your neighbouring home, that's possible too. And garage doors, handmade to order from hardwood such as iroko, feature classic, chunky wrought-iron fixtures and fittings. They can also be easily, and discreetly, automated.

Smart growth

Many years of hard work is paying off, and The Classic Barn Company's enviable reputation now returns a substantial volume of business through referrals and an element of repeat business. 'Yes, some clients do have room for more than one barn.' The company has unquestionably gone from strength to strength. 'We've grown the business and the projects we've done have been awarded year on year – and we are increasing in size and complexity. It's testament to where The Classic Barn Company is going. Builds are getting bigger and more detailed, which is very rewarding.'

Some of these bigger projects actually involve multiple builds or bespoke designs, but Andrew, with his business development background, takes it all in his stride. 'My strength is having the staying power and mental picture to develop something I believe can work,' he says. 'To create something others wish to buy into you need to differ; you need to remove restricted mindsets and build a team of capable professionals to develop your vision into an attractive proposition. This is what I wanted the business to achieve and it's this freedom that has enabled the company to grow into what it is today.'

With a head office based in the heart of Hampshire and secondary offices in Sussex and Gloucestershire, the company is within easy reach of many counties in southern England – and its ethos, craftsmanship and service seem to be the talking point of esteemed clientele. 'We have been receiving plenty of attention these days. Even royalty has shown interest in our work. When others start approaching you because of your reputation, then that's something that makes you feel particularly proud.'

When asked to name a specific building that best showcases what the company can offer clients, Andrew says: 'The project that springs to mind is a one-off bespoke room above a classic barn. It has a glazed balcony, feature oak trusses and a Juliet balcony as well. Every inch of the design was considered, designed, engineered and created by us. It's now being released through our marketing.'

So what's next in the pipeline? 'My favourite subject,' smiles Andrew. 'What's next is exciting. I have been implementing some big changes to the business to increase productivity and target key customers who we have learnt benefit most from our classic designs. It's a more tailored approach and part of this involves networking and utilising referrals and relationships formed over the years. Separate to this, I've been approached by investors in other fields who are interested in the brand and our approach, so we are exploring ideas on using the brand in different fields. It's early days, but the possibilities are endless.'

classicbarns.co.uk; 0844 800 0708





Turned stair spindles

Richard Findley makes a batch of replacement spindles



Making stair spindles is probably the job that is most commonly associated with a turner such as myself. Although I make more than my fair share of them, they seem to come in waves, often with two or three orders coming along at the same time, having turned none for several weeks, or even months.

For me there is no such thing as a 'standard' spindle. If it were standard, you would be able to buy them from one of the large DIY superstores, often for less than I can buy the wood. Normally,

spindles are made in huge batches, which, once completed, are rarely repeated, so several years later, matching spindles can't be found, and that's when a hand turner, such as myself, is called.

This set was made for a customer with several broken spindles that needed replacing. Stair spindles are made in much the same way as any other turned spindle, although their length and slenderness can cause some issues, which I will try to address here.

Technical drawing of a sword hilt (pommel and crossguard) showing dimensions in mm and inches. The drawing includes a side view of the hilt and a detailed view of the crossguard assembly.

Side View Dimensions:

- Pommel:** 32mm Ø (1 1/4 in), 22mm Ø (7/8 in), 25mm Ø (1 in), 23mm Ø (15/16 in), 27mm Ø (1 1/8 in), 32mm Ø (1 1/4 in).
- Guard:** 32mm Ø (1 1/4 in), 22mm Ø (7/8 in), 27mm Ø (1 1/8 in), 32mm Ø (1 1/4 in).
- Hilt:** 32mm Ø (1 1/4 in), 22mm Ø (7/8 in), 27mm Ø (1 1/8 in), 32mm Ø (1 1/4 in).
- Decorative Elements:** 3 x Beads 7mm (9/32 in), 10mm (3/8 in), 12mm (1/2 in), 10mm (3/8 in), 78mm (3 1/8 in), 21mm (13/16 in), 76mm (3 in), 45mm (1 3/4 in), 8mm (5/16 in), 6mm (1/4 in), 3mm (1/8 in).

Detailed View Dimensions:

- Guard:** 32mm Ø (1 1/4 in), 22mm Ø (7/8 in), 27mm Ø (1 1/8 in), 32mm Ø (1 1/4 in).
- Hilt:** 32mm Ø (1 1/4 in), 22mm Ø (7/8 in), 27mm Ø (1 1/8 in), 32mm Ø (1 1/4 in).
- Decorative Elements:** 3 x Beads 7mm (9/32 in), 10mm (3/8 in), 12mm (1/2 in), 10mm (3/8 in), 78mm (3 1/8 in), 21mm (13/16 in), 76mm (3 in), 45mm (1 3/4 in), 8mm (5/16 in), 6mm (1/4 in), 3mm (1/8 in).



- 25mm spindle roughing gouge
- 10mm beading & parting tool
- 10mm spindle gouge

- 180 grit abrasive
- Vernier callipers
- Chuck
- Homemade long wooden toolrest
- Homemade centre steady

Timber

Preparation

- PHOTOGRAPHS BY RICHARD FINDLEY



My steady is a very simple design, based on one used by woodturner Gary Rance. If you Google 'homemade steady, wood lathe' you will find a huge array of different designs. My steady has a replaceable section that cradles the job in hand. With softwood spindles such as these, there should be no burning and only a slight increase in the noise level. The cradle is a little deeper than half of the spindle and offers support to counteract the forces applied by the tool and helps to prevent the spindle from bouncing and vibrating.

The cutout in the steady should be several millimetres larger in diameter than the final required size. To fit the steady I simply make a series of cuts along a section near the centre of the spindle; after each cut I try the fit with the lathe still running. As soon as the cutout in the steady slots around the spindle without binding, it is ready to be secured in place by nipping up the nut with a spanner. In this instance the steady was fixed just to one side of centre.



Making the spindles

- 4 My first cut is made with the tip of my beading & parting tool and separates the square pommels from the turned area of the spindle. I am working at 1,440rpm throughout the job.
- 5 Next, using my 25mm spindle roughing gouge, I gently smooth out a section near the centre for my steady to sit.
- 6 With the steady secured in place, turning can continue. I use my roughing gouge to round off the rest of the turned areas on the spindle, taking it down to the maximum diameter needed.
- 7 I then bring up my copy template and mark the positions of the

shape at each end. This spindle is symmetrical, having the same details top and bottom, with an evenly spaced beaded detail either side of a central bead and cove combination.

- 8 I now block out the shape using my Vernier callipers and beading & parting tool. Notice that I have made a slight incision at each pencil line. This is because often, when using softwood, as you cut in with a parting tool it can pick up strands of timber along the surface, which can spoil the tops of your beads. Making such a cut will prevent this from happening.



- 9** With the sizing cuts made, I continue to use my beading & parting tool to roll the beads, making sure I only use the very tip of the tool to avoid a catch.
- 10** There is a very fine fillet between the beads at each end of this spindle. The only tool I have that would make such a cut is my thin parting tool. These tools are usually better on more dense timbers but kept sharp and with light cuts, it works fine here too.
- 11** I then switch to my 10mm spindle gouge to cut the coves and the long curve on the tulip or vase shape.

- 12** The same cut shown at the other end. The cut works the same way in both directions. Remember to only use the tip of the gouge, cutting just to the left of the tip when working to the left and just to the right of the tip when working to the right.
- 13** I then make a sizing cut on the central section of the spindle. I left this thick to keep the spindle as strong as possible for as long as possible while turning each end.
- 14** The next step is to take this down to the correct diameter with my spindle roughing gouge.



15 Bringing back the copy template I can then mark the positions of the triple bead detail...

16 ... and cut them with the tip of my beading & parting tool.

17 The last detail is the central bead and cove combination.

Although quite an attractive design you can probably see that it is the thinnest, and so weakest part of the spindle, so perhaps not the best design as far as strength goes?

18 The final cuts with the spindle roughing gouge remove the excess timber where the steady has been positioned. Light cuts

will take this away easily and the steady can then be slid back out of the way.

Finishing

19 All that is left to do is carefully sand the spindle, flexing the 180 grit abrasive into and around all of the details. Notice once again that I am sanding with the toolrest in place but the correct technique ensures this is quite safe.

20 Here are the finished spindles alongside the original sample.

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is more

Upcycled potting bench

Don't chuck out that old sink, follow Krishan Vara's example and use it to pot your plants instead!

Over the last few years my wife, Lisa, and I have been renovating our 1930s semi-detached home. The house had not been touched since it had been built and out of the kitchen came a beautiful double drainer enamel sink (photo 1). We kept it for a few years because it was too good to get rid of, but we were unsure of what to do with it. With garden space being limited the sink had to go or find a new use as it was getting in the way. Lisa suggested the sink could be repurposed as a potting bench. It made sense; the bowl would contain the compost with the drainers acting as a useful work surface.

- 1 Fortunately, I had some 100 x 50mm softwood timber in the garden, over-ordered from when I constructed our decking area. It too, was too good to get rid of and I knew one day it would become useful. This was going to be a no-frills job, done in half a day with just some basic tools.
- 2 I first constructed a frame for the sink to sit onto, keeping it flush on all four sides. I made sure the thickness of the timber would not clash with the bowl or the taps, the taps were left on for effect. Using a try square, I marked and cut two pieces of the 100 x 50mm timber to the length of the sink. I cut another two pieces to the width of the sink, minus double the thickness of the timber. Using 100mm screws, I pilot drilled and screwed the frame together and used a little exterior wood glue on the mating surfaces. This was probably the most 'technical' part of the build. I checked for squareness, but this would be ultimately determined by how square the timber had been cut.
- 3 As Lisa was going to be the main user of the potting bench, it had to suit a height she was comfortable working at – potting ergonomics you might say. We compared different work surfaces from inside the kitchen, the dining table and other surfaces until we agreed on a height. That was the 'scientific' bit. I cut four lengths for



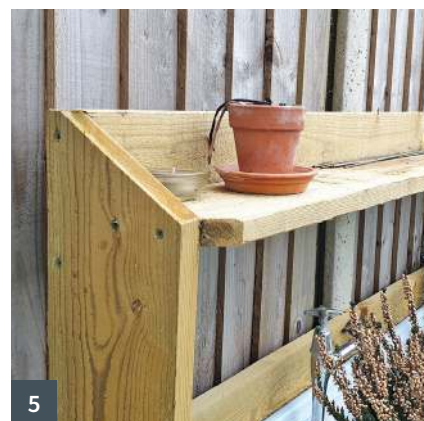
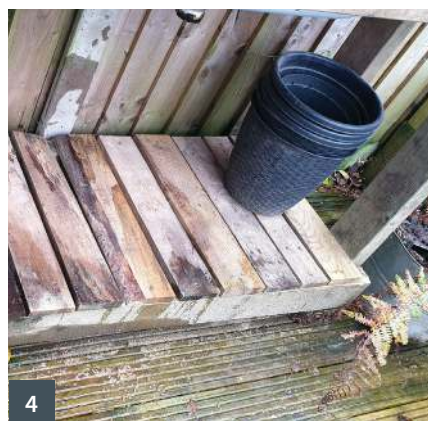
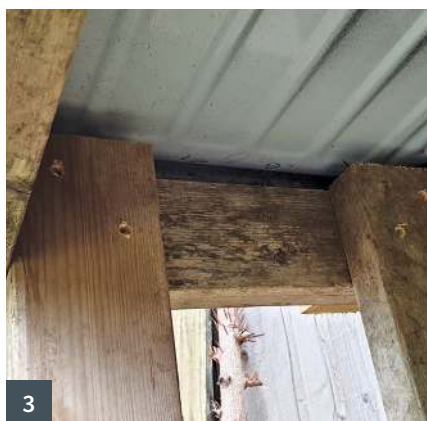
PHOTOGRAPHS BY KRISHAN VARA

the legs and as before pilot drilled, glued and screwed on the inside four corners of the sink frame.

- 4 To give the structure some stability I added a low-level shelf positioned about 75mm or so off the ground to maximise storage of pots and boxes on the shelf. I cut two lengths of the softwood, the same length as the sink. The length had to be measured at the top, i.e. the sink and not at the bottom of the legs just in case they were bowing in or out. I fixed them to the outside of the legs, as you can see here.

I have a woodburner and often collect pallet wood as kindling. I cut lengths of the pallet wood to the width of the sink which will be used as the shelf. This would ensure a consistent rectangular shape of the shelf to match the sink. I screwed the pallet wood slats down with decking screws I had left over. I left small gaps between each slat for water drainage and swelling or shrinkage. This completed the bottom half.

- 5 Lisa wanted a shelf to hang some gardening hand tools from, and



somewhere to house canes, small pots and other bits and bobs. I had to buy some extra timber to make this. I bought some 6 x 1 tanalised timber from a well-known DIY store. I created a shelf by cutting two pieces the length of the sink and fixing them together with decking screws in a T-shape. This had two purposes, firstly so that the shelf was supported so would not sag and secondly so that the shelf had an upstand. It was screwed together at approximately 250mm intervals. With the shelf sorted Lisa and I had to agree

on an appropriate height for it to be set at, this would determine the length of the uprights. These were cut to size and the shelf fixed at one end, the top end.

- 6** With Lisa's help, I offered this small structure to the potting bench, got it square and screwed into place.
- 7** I added a rear upstand so that soil and 'stuff' wouldn't be pushed off the back of the sink surface. Some hooks were added to the underside of the shelf to hang hand tools or gloves. There you have it, a repurposed sink and some surplus timber

to make a potting bench, all done in a few hours. We did consider little additions like wheels on one end so that the whole bench can be carted around the garden, but we decided against that because it was unlikely that we would ever do that. At some point we may also add some old PVC 40mm pipe for the canes to sit in. The soil in the basin does need to be able to drain out rainwater so a bucket to catch this underneath is useful. What else would you add or change?

Kitchen drawers

Hendrik Varju revamps four kitchen drawers to give them a fresher look

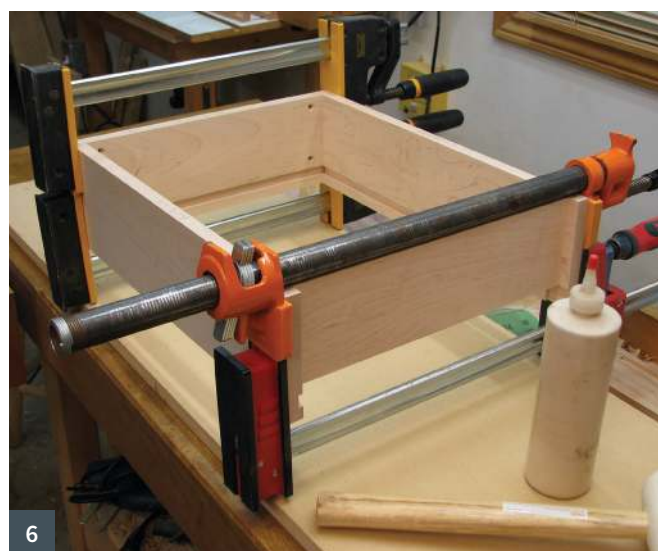


As part of a wider kitchen redesign, I decided to update the cabinet drawers. Fortunately, our previous kitchen design, which I was not changing, had only four drawers so it was not a monumental task by any means. Still, there is only so much time to work on my own kitchen while simultaneously running my woodworking business. So every time new work came in the door, my own kitchen got pushed to the bottom of the list.



1 The old kitchen cupboards, made circa 1968

PHOTOGRAPHS BY HENDRIK VARJU



2 Four drawers need replacing, two on each side of the kitchen, plus two faux drawers in front of the sink **3** Cutting the rabbet joints at the front of the drawers with a dado set and sacrificial fence **4** Dado joints at the back of the drawer are cut in a similar manner **5** Grooves for the drawer bottoms run right through the rabbetted area **6** Four clamps complete the glue-up. No need to insert the drawer bottom yet

Drawer design

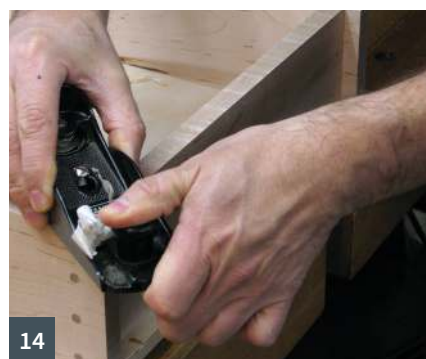
The design of the drawer front was super simple. Just a rectangular piece of 22mm-thick black cherry, with the drawer pull positioned off centre according to the golden ratio. Given the doors had a simple cherry frame with no routed corners, I decided that the drawer fronts should also be plain. I toyed with the idea of making the drawer fronts frame and panel, with veneered panels the same as the doors. However, the panels would have been absolutely tiny and in the end my wife preferred to keep it simple. Sometimes simple is good, and it certainly works with my time constraints.

The next design issue involved the drawer carcasses themselves and how I would build them. I always prefer to use solid wood if possible, except for the drawer bottoms, so I decided to go with soft maple to give ample contrast between the drawer sides and the dark cherry false fronts. In terms of joinery, I almost always use a simple dado joint at the back since the rear joint is usually hidden. At the front of the drawers on a piece of very fine furniture, I prefer handcut dovetails but on a kitchen project I really felt it would be overkill. So I opted for one of my

favourite quick drawer building methods: I used rabbet joints at the front, pinned with solid maple dowel rod.

The rest of the design was highly dependent on the drawer slide design. I chose Blumotion Tandem Plus Slides, which ride effortlessly. Unfortunately, these kinds of slides have all kinds of very specific installation requirements, so you have to build the drawer with those details in mind. The slides come with an installation instruction guide requiring a degree in physics to understand! I'm sure it's easy to understand for kitchen cabinet shops that use these slides all the time, but for someone like me who normally builds traditional drawers with dovetails and wooden slides, there was a lot of head scratching involved.

There was also the issue of making two fake drawer fronts to go in front of the sink. As you can see in the 'before' picture, there was just a solid wood panel there before. But I thought it would look better to make two fake drawer fronts there, complete with pulls. That required some extra construction work on the cabinet, but all fairly rough carpentry really.



7 Judicious use of glue means no squeeze-out on the inside of the drawer, which is pre-sanded **8** Drilling the dowel holes on the drill press **9** Gluing in the dowel rod to pin the rabbet joints. Repeat for the dado joints too **10** This Veritas flush trim saw makes quick work of slicing off the dowel ends **11** The end grain of the drawer sides will need a bit of trimming too with a low angle block plane **12** Three wood screws will secure the plywood bottoms to the drawer backs **13** Sanding the outside of the drawer with a random orbit sander **14** A standard angle block plane cleans up the drawer edges, followed by some light sanding if necessary

Building the boxes

I had to build four drawer boxes in total. Two were slightly wider than the other two based on the drawer openings but all of the other specs were the same. I started by milling up the drawer sides, fronts and backs. I normally build these parts 19mm thick except for very small, dainty drawers. But the Blumotion slides required 16mm maximum thickness, so I went with that. The boxes were just under 460mm deep, around 360mm wide and 125mm tall.

As you can see from the photos, I start by cutting dados and rabbets on the inside face of the drawer sides, just 5mm deep. I don't mill the box front or back to final thickness until after this joinery has been cut, since the thickness planer can easily creep up on a final measurement. I also don't finalise the width of the drawer back until after the grooves have been cut for the drawer bottoms.

You'll see that the way the dados and rabbets turn out on the drawer sides, the grooves for the bottom panels can be cut quickly as through grooves on the tablesaw. The same groove can be cut on the box front too, but I make the drawer back extend only to the top of the bottom panel. That way the bottom can be simply slid in afterwards and secured to the bottom edge of the back with a few screws. I came up with this drawer design over 20 years ago and it's my go-to drawer building method when I'm not using handcut dovetails.

I made the drawer bottoms out of 12mm Baltic birch plywood, which is ample to handle the screws for the special runner hardware mounted on the bottom of the drawer. The bottom panel also had to be positioned 12mm above the bottom edge of the drawer sides for the runners to work correctly.



15 Counterbores and clearance holes in the drawer fronts for the pulls **16** A straight bit on the router table will cut grooves for the keyhole slot hardware for the two faux drawer fronts **17** A featherboard ensures accuracy and safety when cutting the stopped grooves **18** A nice fit **19** Don't forget the screw holes for the hardware, and a second groove to give the large screw head some room **20** Installing the Blumotion hardware at the front corners under the drawers **21** Two screws go into the drawer bottoms and two more travel diagonally into the drawer fronts

Assembly

Once I had completed the drawer box parts, I also had to remember to drill holes to attach the false fronts later. It's so much easier to do this before assembly. I also sanded all the surfaces that would later become the inside of the drawers. The outside surfaces can wait until later. Then I gathered up some clamps and glue to prepare for the glue-up.

The fact that you don't have to include the drawer bottom during the glue-up is one less headache to worry about. I just run a tiny bead of glue along the centre of the dados, stopping at the grooves for the drawer bottoms. I don't need much glue, as the joints will be pegged later anyway and I'd like to avoid glue squeeze-out. The rabbet joint is the same except I spread the glue along the entire rabbet.

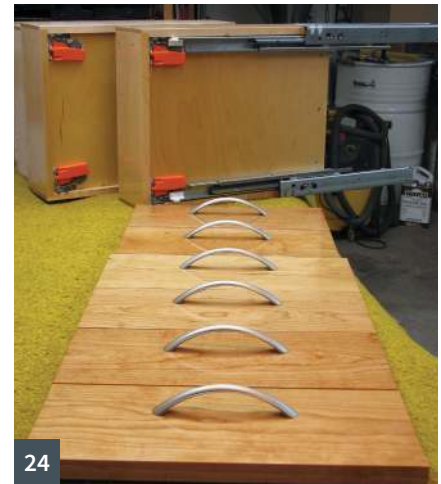
Only two clamps are needed at the dado joint and two more at the rabbet joint. Rabbits technically need clamps in two directions, but I can usually wrestle the joints together well enough with my hands to keep the drawer fronts tightly pushed towards the back of the drawer. Sometimes a stubborn one will require one clamp temporarily to pull the drawer front backwards, but once the side-to-side clamps are on snugly then the other clamp can come off.

You'll notice that the dowel pegs don't even exist yet at the glue-up stage. The small amount of glue I use for the glue-up is enough to hold the drawer together temporarily. After drying at least overnight, I then drill the holes to peg the joints at that stage.

Dowel pegs

The dado joint is strong enough without the dowel pegs, but the minimal time and effort is worth it. A drill press makes quick work of drilling the holes, passing through the joint and perhaps 20mm or so into the second part. I drilled 6mm diameter holes in this case and used 6mm hardwood dowel rod. Be sure that the lowest dowel hole will be above the bottom edge of the drawer back and also high enough above the bottom panel groove.

After drilling, I simply glue in the dowel pegs, which I cut from a longer length of rod. Then slice off the excess dowel with a good flush trim saw and a hand plane will do the rest. The outside of the drawer will still need sanding and the top and bottom edges might need some hand planing with a standard angle block plane to flush everything off properly.



22 A routed slot cut into the top face of the drawer bottoms accommodates the Blumotion slide hardware **23** Testing the fit of the hardware **24** Pulls installed in the six drawer fronts **25** Drawer runner installed inside a drawer pocket **26** Completed drawers run like a dream

Drawer fronts and finishing

The false fronts, made of cherry, are 22mm thick and large enough to overlay the face frame all around. They need holes and counterbores on the back for the drawer pulls, plus a good sanding. Later, during installation, I mark the pilot holes required for the screws that will hold them to the drawer front and drill those on the drill press.

This project had one other complication. As you can see from the 'before' picture, the old kitchen had a plain wooden panel covering the hole in front of the sink. I installed an extra bit of face frame there in a cross pattern, secured simply with screws and corner brackets. Then I painted it to match the rest of the face frame. I made two new false fronts and embedded keyhole slot hardware in the back face. The round-ended groove was easily cut on the router table. Then I drilled tiny pilot holes for the screws and used a Forstner bit to chew out a channel in the middle to accommodate the screw heads. This allowed me to simply drive two screws into the face frame for each false front and slide the fronts on for a tight press fit. The tightness of the fit depends on how far the screws protrude from the face frame. I also applied felt dots on the back of the false fronts so that they wouldn't scratch the face frame as I slid them sideways. The end result is the appearance of two additional drawers, although the ones in front of the sink are actually fake. The French might say 'faux'.

From there, I applied the same finish to the drawers and false fronts

as I used for the doors earlier – five coats of my custom Danish oil blend, which is three parts Watco natural Danish oil to one part oil-based polyurethane varnish. I allowed 24 hours of dry time between coats and a quick 600 grit wet-dry sanding. Then a coat of paste wax after the last coat dries for at least several days.

Installation

With the fake drawer fronts already installed in front of the sink, now the real drawers had to be installed. Each drawer pocket needed a custom strip of wood attached inside the cabinet to bring the inside face out flush to the face frame. This would then be used to mount the drawer runners later. And in between each pair of drawers I also had to make a thick strip of wood to run from the back of the face frame to the wall in behind. All of these construction items were quickly made and simply screwed into place.

I screwed in the slides according to the manufacturer's instructions and a special piece of hardware also had to be screwed to the underside of each drawer in the front corners. These slides are fantastic and can even be adjusted up and down both front and back after installation. The drawers open like a dream and if you try to slam them shut it simply can't be done. They stop before hitting the face frame and then ease closed the rest of the way in super slow motion. They run so perfectly you just want to play with them all day!

In the workshop, scrap wood is always useful as it can be turned into small gifts and simple objects. And if you want to try out some ideas without spending a lot, you just need to be ingenious with your designs. This project is a bottle opener in the shape of a fish, a nice, useful object as well as simple and quick to make. You could devise an alternative design if you prefer. The only caution is the need for it to be strong for its effectiveness and ease of use.

Fish-shaped bottle opener

Mattia Migliorati puts some scrap wood to good use



YOU WILL NEED

Scrap wood (minimum thickness 15mm)
Brass tube, diameter 20mm
Power or hand tools
Sandpaper
Oil finish

Project creation

The bottle opener shape is a stylised fish, with an elongated body like a tuna, the tail of a freshwater fish and the disproportionate mouth of the shark. The mouth is a lever used to lift the cap from a bottle, which allows it to impart considerable force to the edge of the cap and bend it upwards and free it from the bottle. The mechanism is made with 1mm brass from a piece of pipe. The bottle opener measures 120mm head-to-tail and I made mine from a 15mm-thick ash offcut.

Ergonomics

The shape lends itself really well to making a bottle opener, the elongated shape and the position of the mouth assist the movement of the lever on the cap and it has the right ratio between ergonomics and functionality. The wooden board should not be too thin, nor too soft, it must hold the brass shape and cope with the force exerted by the lever so the direction of the grain must follow the length of the fish body to make the bottle opener stronger.



PHOTOGRAPHS BY MATTIA MIGLIORATI

1 Some scraps, especially hardwood that has already been planed or sawn, can be useful. Don't throw them in the stove! **2** Marking out a selection of fish-shaped bottle openers on scrap wood

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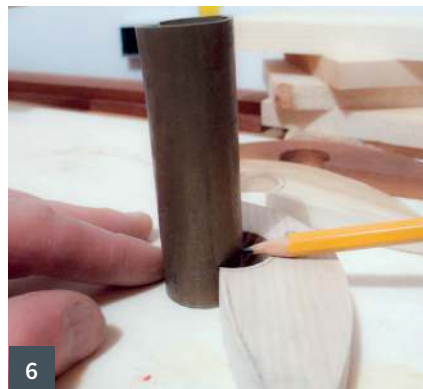
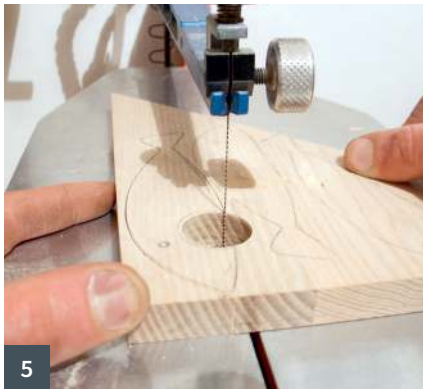
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3 Trying out a cut to check cut accuracy with both hands giving guidance **4** The mouth hole needs to be drilled before shaping so the bit cannot wander **5** Cutting from the hole outwards ensures a neat 'lip' to the profile **6** Marking where to saw the brass tube to match the wood thickness **7** A metal cutting blade has been fitted to the scrollsaw **8** A vertical cut on the scrollsaw to open the ring shape **9** Shaping the metal with a hammer to create the tight curve required **10** The excess metal can now be removed prior to fitting

Scrollsaw work

A scrollsaw is the most suitable tool for shaping small curved objects like this, either an electric saw or a manual bow type. Make sure you exert constant pressure against the blade during cutting and keep the workpiece flat on the support table. Gauge the 'feel' of how the teeth are penetrating the wood so the advance speed gives evenness to the lines and curves.

Brass 'C' shape

To make the metal 'C' use a piece of brass tube 20mm in diameter and 1mm thick. Brass, particularly of this thickness can be worked easily. By using a section of pipe there is no need to bend the metal. First of all, use the mouth cut out in the fish to determine the required length of pipe needed. Cut with a hacksaw or scrollsaw fitted with a metal cutting blade. The ring is then cut open crosswise so the tooth shape is made. To bend the metal, hold the ring with pliers. Once the whole thing is placed on a solid support such as a vice, hit with the hammer until the desired curve is obtained. The excess metal at the ends of the curve is now removed so it will fit the hole in the wood.



11 Drilling one of the two fixing holes from the inside **12** After countersinking the brass, CA adhesive is applied to aid fixing **13** Using pliers to 'spring' the brass in to place, a tight fit is needed **14** Punching a nail in prior to peening the head over for neatness **15** Using a sanding board to level the metal with the wood **16** All surfaces are sanded smooth on the sanding board **17** The edges also get the abrasive treatment and then fine sanding overall **18** The finished bottle opener ready for oiling

Fixing metal to wood

The brass insert is fixed to the body of the fish with two nails so that it stays in position during levering. Due to the open shape it is easy to drill holes in the metal on the pillar drill. Then use a larger diameter drill bit to create countersinks for the nail heads to sit in. If you use brass tacks the heads can be peened over and then any roughness can be filed off.

Sanding smooth

The brass sides now need to be ground smooth and the saw cuts bevelled. A sanding board covered with abrasive paper is a good method, by performing large movements you can get a good ground finish quickly. The sharp cut edges can also be smoothed off on this surface.

Finishing

The bottle opener now needs to be sanded using fine-grain abrasive paper on the sides and edges, generally improving the lines of the fish and correcting any imperfections caused by cutting out the shape. An oil finish will highlight the wood grain and is quick and easy to apply. Your fish-shaped bottle opener is ready to be used – so good health!



FIND YOURSELF IN A FOREST

There's something magical about being in a forest, listening to the whispering of the old trees. Grab your hiking gear and take a journey through some of the world's most spectacular woodlands marvelling at the beautiful living sculptures, displays of colour, distinctive wildlife and the many other treasures concealed within...

Daintree Rainforest, Wet Tropics of Queensland, Australia

Travel back in time with a trek through the extraordinary 180-million-year-old Daintree Rainforest, the most accessible part of Queensland's Wet Tropics heritage area.

This coastal rainforest is the back garden of the Great Barrier Reef and a walk here can feature swamps, mangroves and eucalypt forests – as well as Australia's unique wildlife.

Near the resort town of Port Douglas, there's a loop track at Mossman Gorge that, after a bridge, provides an hour-long rainforest walk, with dazzling views from the Manjal Dimbi Lookout. Listen for the 'wallock-a-woo' call of the wompoo fruit-dove and enjoy the company of Australian brush turkeys.

For more of a challenge, experienced bush walkers with good fitness levels can climb the Mount Sorrow ridge trail 103.9km north of Cairns. Set off well before 10am to make the most of cooler

temperatures and allow time for plenty of rest stops. Look for Boyd's forest dragons, spangled drongos, topknot pigeons and watch butterflies dancing on the wind. There are myriad trails, tours and activities that you could add to your list – even exhilarating jungle surfing experiences.

Highlights: an extremely rare and primitive flowering plant, idiot fruit, found only in the Daintree Rainforest.

Food & drink: Port Douglas has plenty of places to eat, including the Kingfisher Café and Gecko Bar. There are plenty of hotels and campsites, but some are likely to be closed in wet season between December and March, or after periods of heavy rainfall.

Be aware of: the restricted availability of shops, services and phone reception. daintreerainforest.net.au

Avenue of the Baobabs, Menabe, Madagascar

Madagascar's first nationally recognised natural monument, this tree-lined avenue in the west of the country is a sight to behold. Marvel at the ancient baobab trees – many of which are approaching their 1,000th birthdays – whose water-filled trunks can have a girth of up to 25 metres.

Baobab flowers bloom at night between February and March and are pollinated by bats and nocturnal insects. Legend has it that if you pick a baobab flower you will be eaten by a lion. After flowering, the tree develops sharp and tangy seeded fruit.

Increasingly rare and under threat, the number of baobab trees left in Madagascar has plummeted because of deforestation. Scientists believe the species has also suffered from the extinction of the country's giant animals, including the elephant bird and giant lemur.

This leisurely stroll across red and dusty soil is best undertaken in cooler temperatures – ideally not long before dawn or sunset. During the rainy season between the months of April to November getting to the avenue can be difficult.

Lace up your walking boots and cherish the experience of gazing up at these rare otherworldly trees.

Highlights: resident wildlife including comet moths, hissing cockroaches and panther chameleons – all unique to the island.

Food & drink: the seaside town of Morondava has a modest selection of hotels and eateries near the beach. Inland are shops, banks, taxis, tour guides, laid-back markets and a local bus stop.

Be aware of: leave high-priced possessions at home and don't take photographs of people without asking.

madagascar-tourisme.com



Cork oak forests, Alentejo, Portugal

With fascinating cork oak trees and cultural delights that capture the imagination, the region of Alentejo is just a few hours drive south from the Portuguese capital, Lisbon. And this tranquil retreat is a great place to slow down and enjoy nature.

Cork oak trees are one of the few species that can regenerate their bark and a single tree can provide enough cork for 4,000 bottles. There are tours available for those who would like to learn more about Alentejo's rich history, especially its cork industry, and ramble across the open woodlands at the same time – search 'Alentejo walking tours'.

Visit Evora offers a 10km guided tour of a local cork oak forest and vineyard. This trek also takes in holm oak trees.

Cork harvesting takes place between May and June and visitors at this time of year get the chance to witness the traditional art of cork stripping.

Highlights: eagles and black vultures as well as black Iberian pigs munching on the acorns fallen from the oak trees.

Food & drink: The Alentejo region is peppered with places to eat and sleep, including thatched farmhouses and wineries. The picturesque village of Marvão, which has marvellous views of Estremoz Castle and the horizon, will provide a treat for your eyes and satisfy the appetite.
visitalentejo.pt



Redwood State and National Parks, California, US

California is home to the tallest trees in the world – giant redwoods – and this complex of parks on the state's northern coast boasts 322km of gorgeous nature trails to explore, so there's bound to be a dream hike for everyone.

The old-growth redwood trees are immense and can reach heights of more than 110m and gain a width of 7m. At the moment, the tallest tree – standing at a spectacular 116m – is located in Redwood National Park. The 600-year-old specimen is nicknamed Hyperion, but its exact location is a secret.

Popular forest routes include the Simpson-Reed Trail in the north, which takes in a pretty stream blanketed in fallen trees, and the rhododendron trail in the south – a favourite with painters and photographers. When planning your visit, consider the current

conditions and check for path closures. Pick your route based on factors including duration, required fitness levels and access using the National Park Website (nps.gov/redw).

Highlights: banana slugs, black bears, northern flying squirrels, elk and bald eagles.

Food & drink: there aren't any shops, cafés or restaurants within the parks, so it's essential to pack a picnic or find refreshments on the park boundaries. To stay wild, arrange an overnight stay within the reserve. Choose between four camping grounds that include facilities such as hot showers, fire pits and food lockers and eight designated backcountry camps – permits (available free) are required. visitcalifornia.com

Black Forest, Germany

Explore the Black Forest, synonymous with castles, cuckoo clocks and deep-green pine trees, and enter the world that inspired the classic folk tales of the Brothers Grimm.

Covering almost 161km from the River Rhine to the spa town of Baden-Baden near the Swiss border, this historic region is blessed with spectacular scenery, including mountains, rivers and lakes. Supplying marvellous panoramic views, the tallest peak can be found in Feldberg near the Alps – and the tallest waterfalls are the landmark Triberg Falls.

Head to the town of Hamelin, famous as the home of the Pied Piper (Der Rattenfänger), for the starting point of the enchanting 219km Weserbergland Route. The footpaths through the forest will remind you of Hansel and Gretel. What they may lack in hidden gingerbread cottages is more than made up for in romantic castles and palaces including Werra Castle, said to be the place where Sleeping Beauty fell into her slumber.

Highlights: sofas and benches where you can relax in the middle of the woods. These Wald-Wohnzimmer – ‘forest living rooms’ – are a new addition to the Weserbergland Route.

Food & drink: for a treat to match the deep, dark and delicious nature of the countryside, take a bite of local Black Forest Gateau or try some of the many traditional German snacks with a rat-named twist at Hamelin’s Rattenfängerhaus.

blackforest-tourism.com



Road to Hana, Hawaii, US

Say ‘aloha’ to the dreamy Road to Hana, which winds through leafy jungles and extravagant cliffs along the northeast coast of Maui. This 103.5km Hawaiian highway has more than 600 bends and gorgeous roadside distractions around every corner – there are black lava beaches, sacred pools, misty waterfalls, old villages and even rare painted forests.

These forests get their name from enchanting multi-coloured rainbow eucalyptus trees. They thrive at the Garden of Eden arboretum and botanical garden – and can grow up to 76m tall. Another area of painted forest can be found around the 6.5km mark of the Road to Hana, and for a hike through untouched glistening rainforest, spare an hour to tackle the spectacular Waikamoi Ridge Trail.

The journey’s end, Hana, is a laid-back, friendly town and a convenient spot to rest up and unwind. Many travellers agree, however, that getting there is the best part.

Get on the road during off-season between April and May or September and November when the weather is still kind and there’s less traffic. Keep driving to enter yet another national park brimming with bamboo forests.

Highlights: mongooses, wild boars and hoary bats. Keep your eyes on the sea for sightings of seals and turtles.

Food & drink: the route is sprinkled with roadside stands, hotels and eateries. To cool off, try Maui’s speciality – shaved ice.

Be aware of: drive safely along this extremely windy road. The phone signal is weak so download a map. *tourmaui.com*

Kasugayama Mountain Trail, Nara, Japan



Experience tranquillity on a hike through the ancient Mount Kasugayama Primeval Forest, which acts as a magical backdrop for Nara's most famous residents, wild sika deer.

The forest has ancient cedar trees as well as maples that produce a kaleidoscope of vivid colours, blazing red in autumn. It's also a haven for wildlife, including rare flora and fauna. If you're really lucky you might see a white-cheeked flying squirrel or a brilliant ruhmisu butterfly.

This bracing stroll starts at the Kasuga Taisha shrine – the south entrance of the trail – and takes around two hours, finishing in Nara Park where you will encounter herds of deer.

Visitors can feed them with special crackers (available in the park) and some deer will bow to you in the promise of food.

Highlights: intriguing shrines and Buddhist statues scattered throughout the forest.

Food & drink: the thatched teahouse Mizuyachaya near the north entrance of the trail – in the heart of Nara Park – is the perfect place to pause and take some refreshment.

Be aware of: be cautious when feeding the herds. They can always sniff out who's carrying their crackers and visitors can easily find themselves surrounded by eager deer.

visitnara.jp

Ubud Monkey Forest, Bali, Indonesia

Wander around the Sacred Monkey Forest Sanctuary in the village of Padangtegal and get acquainted with some of the 700 plus long-tailed Macaque monkeys that live there.

This nature reserve and popular tourist attraction also has many other treasures – including temples protected by magnificent moss-covered stone guardians – and has embraced a philosophy of establishing peace and harmony between mankind and nature, and conserving the environment.

Located within walking distance from Ubud's artful town centre, this tangled forest can be reached via a free shuttle bus (see website for details) or on foot, depending on the weather, and takes roughly an hour and a half to explore.

There is an entrance fee and bananas can be purchased to feed the monkeys. The sanctuary is best appreciated between the months of May and September, which is Bali's dry season. Nearby, vibrant markets, lush green rice terraces and cooling waterfalls are also well worth a visit.

Get planning and have some fun monkeying around in Ubud.

Highlights: the diverse array of trees – word has it there are as many as 186 different species within the sanctuary.

Food & drink: travel back to Ubud town centre to choose from a selection of 'warungs' (local shops), restaurants, guesthouses and hotels to suit a range of budgets.

Be aware of: pack away any items that could attract interest from the monkeys, as they can be curious creatures.

monkeyforestubud.com



ALL PHOTOGRAPHS (UNLESS OTHERWISE STATED): SHUTTERSTOCK.COM



Sky Walk, Monteverde Cloud Forest Reserve, Costa Rica

Experience the forest from a new perspective, night or day, on this elevated trail along treetop suspension bridges. Far from your average jungle trek, this walking tour explores the canopy of Costa Rica's bountiful cloud forest, where 90% of the forest's creatures can be found.

Local guides will lead you across the bridges and provide you with insight into the fascinating native wildlife lurking in the rustling leaves. And if high bridges aren't your thing, there are also more than 13km of muddy trails to explore – some of which are on ground level.

The reserve allows a maximum of 250 visitors at a time to safeguard the fragile ecosystem, so it's wise to book in advance. Get there before the gates open at 7.30am, or visit off-season (between May and June, or September and November). Accessible by car, bus and taxi, the Cloud Forest is just a 6km drive from the 'tico' town of Santa Elena.

Highlights: cute sloths, tapirs and howler and capuchin monkeys – as well as astounding birdlife including parrots, toucans and resplendent quetzals.

Food & drink: take tea in a tree house. The Monteverde area has many places to eat and sleep including fabulous treehouse hotels. You can also take the opportunity to grab a bite to eat in the Tree House Restaurant and Café nestled in a colossal ficus tree in Santa Elena town.

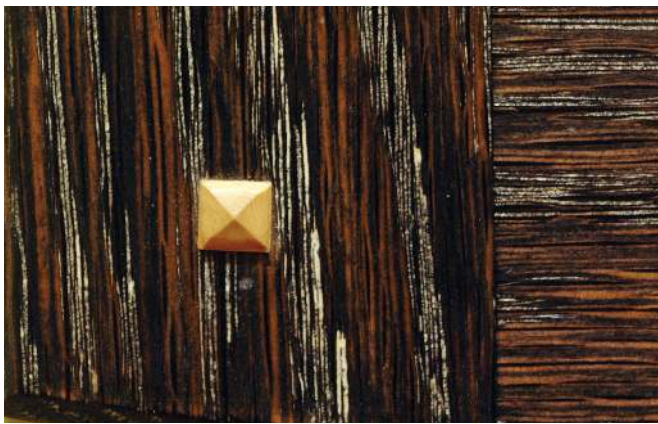
reservamonteverde.com

Words: **Abby Costen**

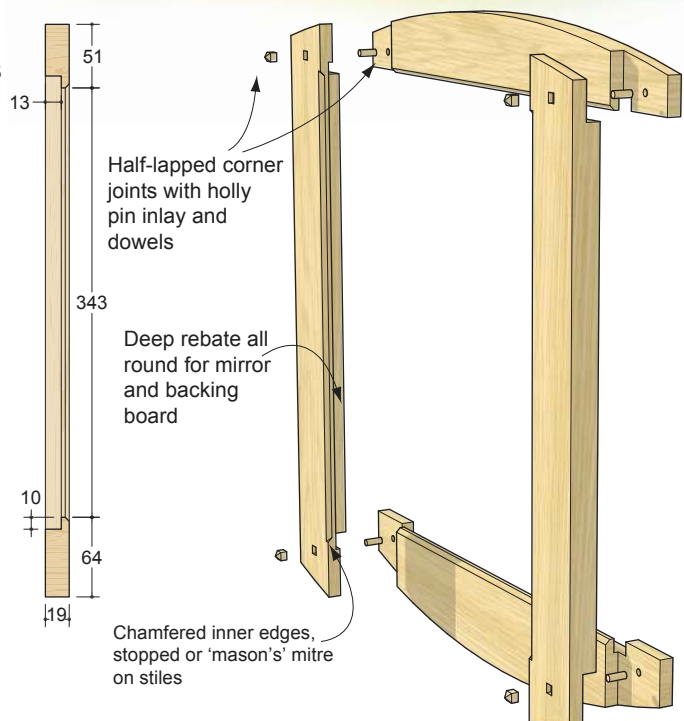
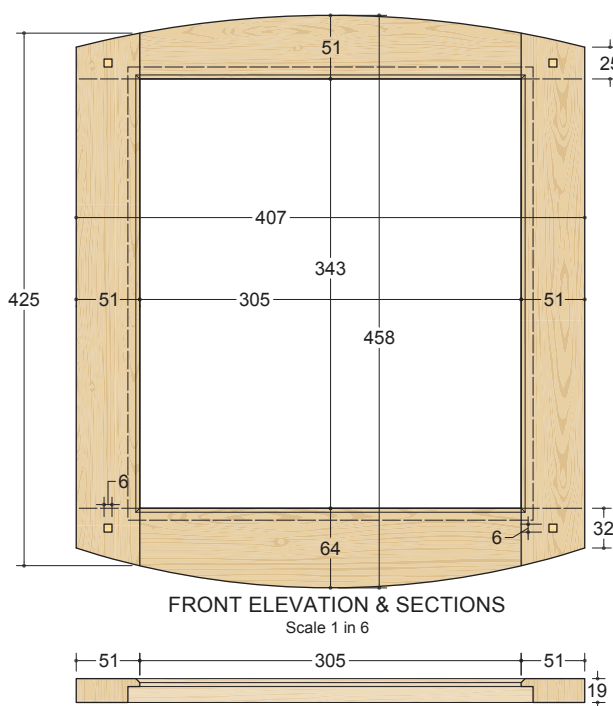
Mirror mirror

Gary Rogowski makes a deceptively simple oak mirror frame with tapers, curves and half-lapped joints

Being 'fairest of them all' won't help you with the success of this mirror project. Think instead: planning, precision and pure contrast. Simple half-lapped frames like this one are easy to cut and have plenty of long grain gluing surface for strength. This makes it easy to shape into the frame and still leave plenty of joint area behind. Plan out your frame shape beforehand and just keep all your parts square or rectangular to make joinery and clamping simpler. The timbers used for this frame are white oak, red oak and holly.



Detail of the ebonised oak frame with holly plug





PHOTOGRAPHS BY GARY ROGOWSKI

Cutting the shoulders

- 1 Two cuts are required for the half-lap joint, one for the shoulder and one for the cheek. Mark all these shoulder cuts out with a marking gauge, then rough out the cheek on the bandsaw. Make a quick crosscut on the bench close to the shoulder line, about 1.5mm away from it and down to the cheek.
- 2 Next, set up the router table with a wide straight bit with its height at half the thickness of my stock. I clamp the fence so the distance to the far end of the bit will give me a cut right at my gauge line. Use a frame member and a backer when making the final shoulder cut. The backer board will help to make a wider package to move across the bit and help to prevent blow-out.

Assembling the frame

- 3 Simple frames like this make for some of the more complicated glue-ups because there are so many directions in which to pull. I set the long rails on my pipe clamps first. This raises the assembly off the bench. The short ends go on and then the pipe clamps pull them in tight, but with room for the two C-clamps that pull the cheeks in tight to one another. Practise this assembly once or twice to get the hang of the process and it will go smoothly. Those offcuts from roughing out on the bandsaw come in handy as clamping pads

too under the C-clamps. Once the clamps are in place, check the diagonals of the frame to see that it's square and use a long clamp on the longer direction to correct it to square.

- 4 Once the frame has dried, clean up both faces of the frame with a No.5 jack plane. If the grain is with me and not too difficult, then this job goes quickly. However, if the grain gives me any trouble, a cabinet or card scraper will remove any tear-out issues. Be careful at the joints where the grain changes directions and move into the board changing your cutting direction to minimise tear-out.
- 5 Next, mark out the frame stile tapers. Measure at the top and bottom of them for the required set-in, lay a straightedge down and mark out the taper. I cut tapers on the bandsaw freehand as it's simple and quick – no tablesaw blade spinning close by my hands and it's easier to push the wood through the bandsaw cut. Stay close to the pencil line to minimise clean up. Plane the cuts with a No.4 or No.5 hand plane being careful not to blow out any end grain at the end of the cut. A simple chamfer cut into the back edge of the rail minimises this issue. Plus I still have the rail shapes to mark and cut.
- 6 I marked out the curved rail shapes using a bent piece of red oak with clamps in place to hold it while I mark out the shape. True up the rail cuts with a spokeshave and scraper.



7 At this point if I'm happy with the shape, it's time to cut the chamfer on the inside edge. A 45° chamfering bit works well for getting the bulk of the work done topside with the router. You will inevitably run into the problem with routers and corners – they don't fit together very well. The bearing-mounted chamfering bit can't cut into the corner so this has to be finished up by hand. This mason's mitre, as it's called, takes some careful work with a chisel. Best to take your time here for a good look.

8 The rabbet cut is next for the mirror and backer board. I clamp my frame between my vice and bench dogs raising it up to allow the bearing to move freely along. I almost always climb cut the edge of the rabbet first moving right to left on the edge. This eliminates tear-out when I finish the rabbet cut up moving left to right. Make the rabbet deep enough for the mirror thickness and a 3mm or 6mm piece of hardboard behind it to protect the mirror. This will necessitate making a series of 3mm deep cuts to get down to depth.

9 The corners, of course, have to be cleaned up with a chisel. Use a wide chisel to mark out the cut and then chop to depth.

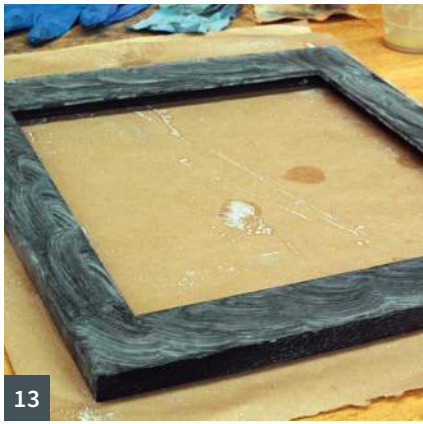
Finishing

10 Clean the corners of the frame with a block plane and a bit of sanding. Then it's time to focus on finishing. If you've sanded, you have to raise the grain before finishing. The ebonising finish is

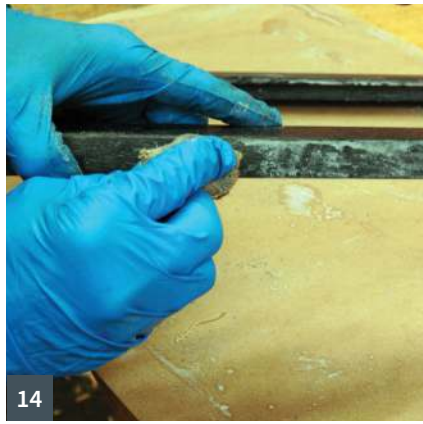
water based so raise with a damp rag. Let the fibres dry before sanding them off with a fresh sheet of 180 grit. Do this several times.

11 My ebonising solution is made of 114ml white vinegar and rusty steel wool. These steel fibres are small enough that they will break down quickly in the acetic acid solution. Put this concoction in a plastic container as the acid fumes will eventually eat away a metal lid on a glass jar. Let it sit for several days, then glove up and wash down the surface of the frame. I have found with white oak that a new ebonising solution works best for the darkest colour. If the staining is uneven then a tannic acid wash can go over the ebonising to darken it. I use the acid powder found at shops specialising in wine-making supplies. Mixed with water it helps to darken the wood. Put on a coat or two, sanding lightly between coats. Also be aware that a coarser surface ebonises better with this approach than a finely sanded one. Sealing off the surface pores reduces the stain's penetration.

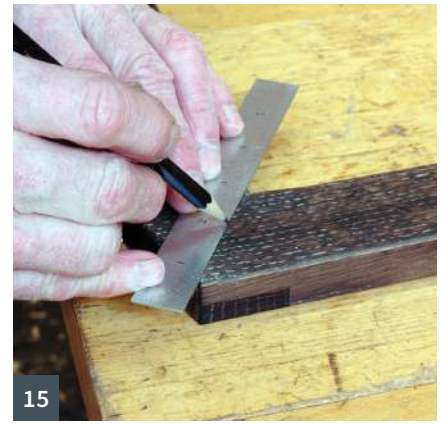
12 The grain fill is an inert whitish paste mixed with mineral spirits (white spirit). Cut the paste by one-third with more mineral spirits to make it easier to work with. Mix this well and then paint it on with an old brush. Move the brush in all directions, especially across the grain. Your goal is to get filler down into the pores. Pound it in if you have to with the brush but push it into that open pore structure.



13



14



15



16



17



18



19



20

- 13** Wait about 15 minutes to let the filler dry and glaze over.
- 14** Then wipe off the excess filler from the surface, corners and edges with a piece of burlap to get most of it off. Keep wiping out the surface until it's clean.
- 15** Pin the joints next and then place your inlay. I mark out each of the corners on the diagonal, find centre on this line and use a scratch awl to place my mark.
- 16** Drill for a 6mm hole for the inlay about 3mm deep. Chop these holes out square.
- 17** Next, drill out for the dowel to pin the joint. A 5mm pin works fine. I don't drill all the way through the joint but stop just short of the back face.
- 18** Use a dowel plate to size the dowel so it enters more easily. Instead

of hammering it through however, mount the plate on two sticks and use the vice to press them through. This saves everyone the consternation of the hammer blows. Use the hammer of course if your therapist recommends!

- 19** Drive and glue the 5mm pin in and use a drift to put it below the surface of the frame so that the inlay can enter. A steel rod works well for this.
- 20** The square plug inlay stock I used is holly. I shoot the edge of the stock on my bench hook to get it to size after bandsawing it close. I chamfer the end of the inlay, cut it to length and then glue and hammer it in place. Using a sharp chisel, I then shape the plug to the desired profile. In this case, I made Gothic-style peaks to my plugs.

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• 7.5" throat size

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DEVIL 7005	400V	5	£84.99	£101.99
DEVIL 6009	400V	4.5-9	£109.00	£130.80
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• With sanding belt

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CR1200	1200	£44.99	£53.99
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POFI400ACE	2000	£99.98	£119.98

Clarke ROUTER TABLE

Router not included

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CON750*	750W	80/10mm	£27.99	£33.59
Bosch PST700E*	500W	70/4mm	£44.99	£53.99

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Kitchen counter top pass-through

Michael T Collins helps out with a property sale by making a new counter top

We have dear friends who are looking to put their house on the market, but when the estate agent recently toured their home they outwardly cringed at the sight of the counter top that they had installed when they first moved in. 'You know better than that!' the agent said. In their

defence, as with many things we do around the house, it was only meant to be a temporary fix. Both she and her husband agreed that it was time to create a stylish piece of furniture that reflects the style of the house and makes it ready for sale.



Measuring

- 1 The existing pass-through is a 20mm piece of ply that they edged with moulding. It is screwed through the top into the horizontal frame and fits perfectly between the wall uprights. I thought it would look better if the new counter was 40mm thick and wrapped around the walls a little. The first step was to get precise measurements. If there is one thing that I have learned over the years it is to do your own measurements – I repeat, do your own measurements!

Materials

- 2 I first had the ply ripped to 15mm over size at the local big box store. I always allow for the extra wastage as many times the blades on the store saws are pretty aggressive and splinter the ply, mainly because they are dull from having cut through pressure-treated timber and the like. Once I got the pieces home I checked for square and ran them through the tablesaw to final dimension.

Note: when ripping large boards it is important to position yourself correctly – push into the fence as you push forward through the blade.

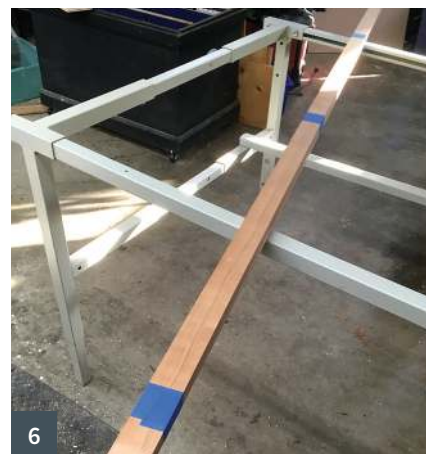
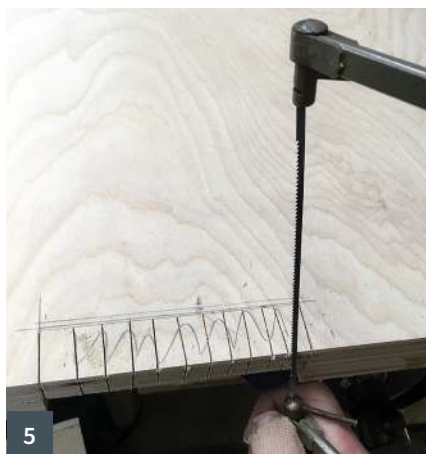
- 3 The best side was then selected and the two pieces glued together with copious amounts of glue and clamps. As I do not have long-reach clamps I simply screwed the two boards together from the underside, the holes would be filled later. I was careful not to put glue on the area that would straddle the existing wall, as this section was to be

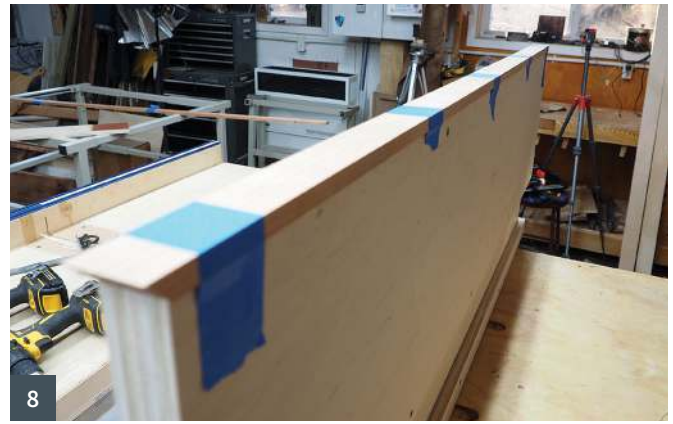
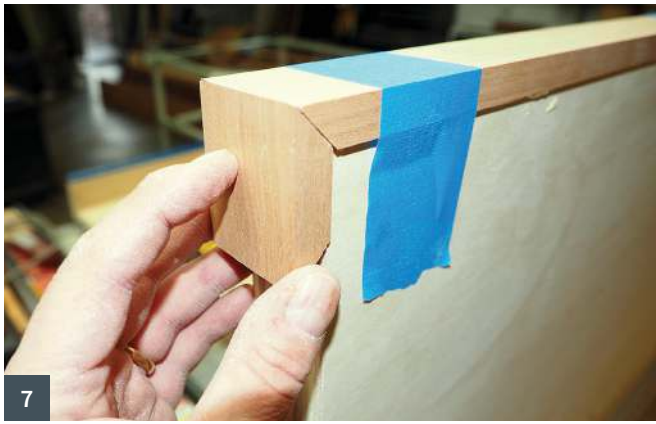
removed once the glue had dried. I left the boards to set overnight.

- 4 The section that was to straddle the wall was easily removed with a couple of passes of the track saw.
- 5 The notches were carefully measured and cut out by hand. The long walls of the notch were slightly sloped inwards with a chisel to allow for them to be lowered into position.

The edging

- 6 In the right setting the edges of ply look great, but in this situation I wanted a clean solid wood look. The cabinets in the kitchen are dark wood and the owner wanted the counter to match. So I ripped two lengths of cherry and planed them down to 10mm. It would be another week before I could get to gluing them to the ply so I secured them together with masking tape to stop them 'reacting' to having just been ripped. Even though this cherry is 50 plus years old and definitely dry, it will absorb any moisture in the air and cup, twist and do whatever it wants to do. The edging strips were cut to about 2mm wider than the thickness of the two layers of ply. My technique for applying edging is as follows: first plane the edge of the ply with a jointer, even though the boards were cut to final dimension. The alternating fibres will have absorbed moisture from the air, and if you run your fingers across the plies you will be able to feel the different heights (fingers make the best feeler gauges). They are subtle but I want an absolutely flat surface to glue the edging to. The next step is to choose the best face and mark it, then cut a perfect 45° mitre on one end.

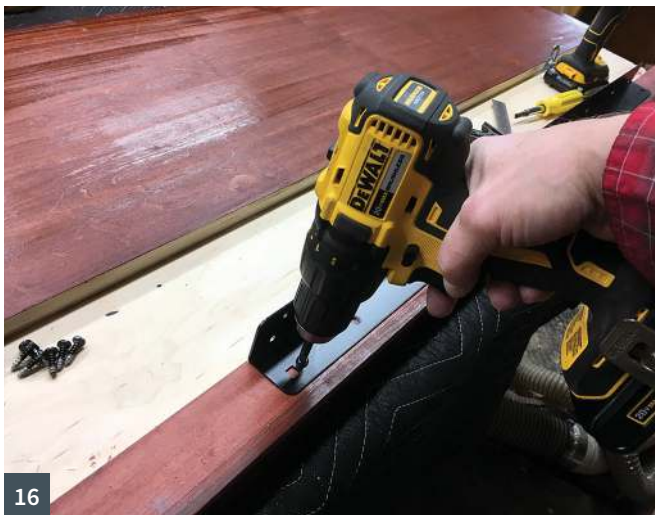
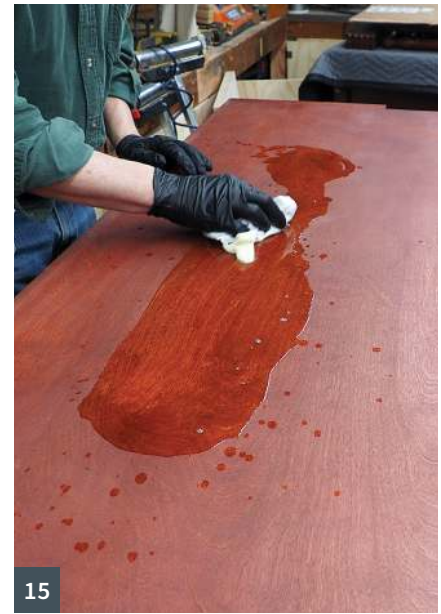




- 7** I make a small off cut, from the same wood, about 8-10cm long and put a 45° mitre on one end – the length of this piece must be able to rest solidly on the face of the ply. Now holding the long length of the edging up to the corner of the ply, offer up the small piece so that it perfectly meets at the corner. Secure the long piece in place and then move to the other end and, with a sharp pencil, mark where the corner of the ply meets the underside of the edging. Then on the mitre saw cut just to the waste side of the line. And check again against the ply. Sneak up on the pencil line until you have a perfect fit at the corner. Using this method the mitred corners will be perfect.
- 8** Glue the first long edge in place using masking tape, leaving a 1mm overlap on each side. There is enough long grain that no other mechanical devices are needed to secure the edging. I let the first piece dry for about 45 minutes before repeating the process for all the other edges.
- 9** Once all the pieces were dry it was time to flush all the edging to

the ply. To do this I applied masking tape to both sides of the ply and routed the edge with a flush trim router. The tape serves two purposes: firstly, it protects the surface of the ply from the bearing rubbing along the edge. Secondly, it moves the flush trim bit out from the ply by the thickness of the tape. I like to use a spiral bit as this slices through the wood rather than a straight flush trim bit that 'bashes' its way through and is likely to cause tear-out.

- 10** Once the edging was routed, I used a block plane to fine-tune the edge. Because I applied the edging on all the sides, the corners are very difficult to flush trim, this was intentional as I wanted to carefully finish the corners with a block plane. Always work the edge from the ply outwards. The edges were given a 45° bevel and the corners were eased.
- 11** I needed to fill the holes so I mixed some wood filler with stain.
- 12** Finally, everything was given a sanding with 120 grit and then 220 and all dust removed.



The finish

- 13** Antique cherry stain was applied to the surface and allowed to seep in for a few minutes before wiping off. I needed to apply a few coats as the ply really absorbed the stain. Water-based stain is going to raise the grain so you will need to sand down the surface, but go lightly using 220 grit. I ended up applying several coats and a final coat of mahogany stain as the cherry did not seem rich enough. I always liken finishing to chemistry – a little of this and a bit of that...
- 14** I had missed a couple of places where the glue had squeezed out and stain does not soak into glue. Sanding at this stage would have run the risk of lightening the colour and at worse removing the veneer, so I opted to use a permanent marker to touch up the areas.
- 15** I allowed the stain to fully dry (important if using water-based dyes and stains), following the directions on the can, sanded and then applied a coat of wipe-on clear satin polyurethane. I allowed this to seep into the wood and then wiped off any surplus finish – going with the grain. It is important to allow poly to fully cure before sanding with 320 grit – this will remove any ‘nubs’ of dust, etc. in the surface. Three additional coats were applied, sanding with 320 between.

The bracket

- 16** The existing counter is simply screwed through the top into the frame. This was most definitely not an option with the new one! Although I joked about using a framing nailer. I took a piece of angle iron and drilled a series of holes in it. The screws were spaced about every 100mm to attach the angle iron to the underside of the counter – this is where all the forces would be in this cantilevered design.

Installing the counter

- 17** The first step was to remove the existing counter. The new counter was lowered into position to make sure that it was going to fit perfectly. I applied a liberal amount of construction glue to the frame and lowered the counter in place, making sure that it was level. It was then screwed through the angle iron into the frame with some stout screws. Once installed the surface was given a coat of furniture polish and left for our friend to enjoy and ‘christen’ with a glass of wine.

Drop leaf table

The unflappable Brendan Devitt-Spooner builds a fuss-free drop leaf table

Not so long ago a lady visited my workshop enquiring about having a small drop leaf table made. She had specific dimensions as it had to fit amongst some cabinets in her kitchen and finding it was impossible to obtain a suitable one in a retail shop, she considered having it made – by me. Having established the sizes and that it would be made from oak I set about preparing a drawing for her.

She had also a desire that the finished table should be simple in appearance with no fussy details or flowing curves. The proposal I presented to her fulfilled her expectations, and having concluded the price and delivery date I pencilled it in to my schedule. Thankfully anyone commissioning a piece invariably realises that it will not be made the next day!



Timber selection

The first part of the process was to select the timber. Having a reasonable supply of timber I put into my kiln some air-dried oak that had been felled about four years previously. Fortunately the tree had been converted into a range of dimensions ranging from 25mm to 54mm so I could make the table from oak all from the same tree.

Table design

Essentially a drop leaf table is quite simple, a four-legged frame with a fixed top and two leaves that are supported by finger jointed 'wings'. However, as with most pieces of furniture, attention to quality of construction is most important. Clients expect a trouble-free purchase and pieces with moving parts are expected to work indefinitely.



Setting out mortises

Having established the timber was ready to use I set about preparing the components. Starting with the frame I cut out the four legs, the two short thick rails and the two thinner long rails. These were planed and thickened to slightly oversized dimensions to allow for a little settlement as they acclimatised to my workshop environment. A week later I finally dimensioned them to their finished sizes. Taking the four legs I positioned them so that their 'best faces' were on the outside. Marking the ends so that they would stay in alignment with each other, I then proceeded to mark out the mortises. Each leg has two different positions as the short rail tenons are offset to the outside while the long rail tenons are also offset to avoid interference so as to maximise the longest possible tenons. Referring to the accompanying drawings should make the layout understandable. Also, to gain the maximum length of the tenons, they are cut so that parts of each run the full depth of the mortise. I cut all these on a hollow chisel mortiser using a 10mm bit. It is a good idea to cut the mortises slightly deeper than the length of the tenon to allow for a little squeeze-out space for excess glue.

Tenons and tapers

Care must also be applied to the marking out of the tenons as the short rail tenons are in a different position to the ones on the long rails. Having a tenoner makes the process of cutting them quite straightforward although using a bandsaw or even sawing them by hand does the job well but a little slower. Although the tenoner forms the cheeks, all the cutouts have to be done by bandsaw or by hand. It is obviously important to make sure that the correct pieces of waste are removed – 'mark once, check twice and then cut'. After fitting all the joints I now had a standing frame. The inside two faces of each leg are tapered so that the whole table looks a little 'lighter'. Measuring down 40mm from the bottom of the rail, a pencil line was drawn on the two inside faces. Using a rule or straightedge a line was drawn from this point to a point that was 20mm in at the base. I prefer to use a black biro for this line as it is easier to see while sawing. Using a bandsaw, I cut to the waste side of the line and then hand planed each face. The bottom of each leg was then chamfered to prevent any breakout when being moved while in use.



PHOTOGRAPHS BY ANTHONY BALLE/GMC PUBLICATIONS

Table top attachment

Attaching the top would be by buttons so the next operation was to mortise or rout out 10mm wide by 40mm long slots positioned 10mm from the top edges of the rails. Metal angle plates could be used but as far as I am concerned, a wooden button is a far better fitting.

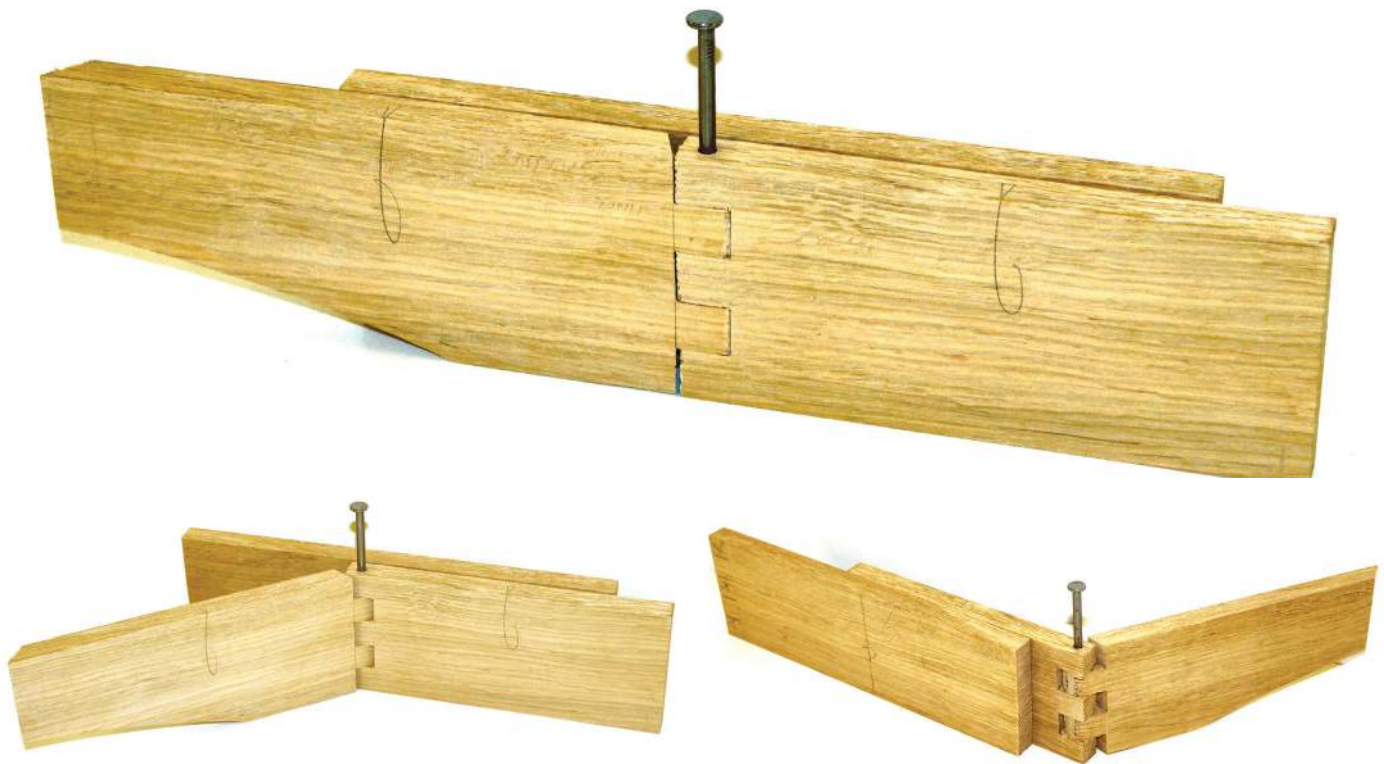
Frame assembly

At this stage the frame could be glued up but before doing this each component was sanded and then finished with Danish oil. With protective clamping blocks at the ready, the frames were dry clamped to make sure the joints would close up. I find it easier to clamp this type of construction in two stages, in this instance clamping the two long rails to the legs first and then when they are dry finally clamping the short rails to the legs. Before the second stage, I made sure that any excess glue was removed from inside the open mortise and also tried another dry run before finally gluing up. To check for squareness, I measured the diagonal distances between the legs, adjusting the cramps as necessary to make sure I had a 'square' frame.

Finger joints

Perhaps the most interesting part of a drop leaf table is the making of the wings which when swung out support the leaves. There are a number of ways to do this ranging from various forms of the finger joint to the use of hinges. The method I chose to use was of a simple five finger wooden joint that could be made quite easily but with a lot of attention to detail.

Another long rail was prepared for each side. It would measure the length of the long side between the legs by 75mm wide by 18mm thick. After marking a face side mark at both ends, each piece was sawn in half. The thickness of the wood was then marked from each end and scribed all the way round. With a mortise gauge set to mark lines at 15mm and 30mm the joint was marked round the ends from the top and the bottom. Having marked the waste with a pencil, the waste was removed using a bandsaw and coping saw. The ensuing fit should be snug without any 'slop' and not too tight. To allow the wing to move, the joint has to be adjusted to prevent any binding. The drawings and photos should explain this. The actual pin is the shaft from a 4in round wire nail. To drill the hole for the pin, the joint was assembled and held



in a machine vice. This kept the pieces together and vertical. I selected a drill bit that gave a snug fit and set the depth gauge to enable the hole to stop about 6mm before the bottom. I then inserted the nail and checked the action. I left the head on the nail at this stage until the last possible moment as trying to extract the pin without its head would be somewhat difficult. I next shaped the wing making it easier to use. Finally, the fixed part of the joint was screwed to the long side rails.

While doing this I found it beneficial to use G-clamps to position it before drilling holes and inserting the screws. With the joint working as required the nails were sawn to length using a hacksaw and then inserted. Candlewax was applied to the knuckles and holes to facilitate a smooth operation.

Table top board assembly

The final part of the project was to make up the top. As can be seen on any quality drop leaf table, the use of quartersawn timber is vital to reduce the possibility of the leaves cupping. With this in mind I selected some nice pieces and spent some time arranging them in a pleasing and practical way. To further minimise any movement issues I used boards at about 150mm wide. The leaves were made up from two pieces while the top was of three. Each was joined using stopped grooves with loose tongues, in this case 6mm birch ply. After they had dried I put them through my widebelt sander, which resulted in the three pieces being totally flat as well as smooth.

Rule joints

The accepted joint for this type of table is the rule joint which is formed by using a pair of dedicated router cutters. As this is something I do not do that often I always practise first on some spare timber. It is far better to set up the cutter depths on scrap timber. Working on the fixed top I set the bearing-guided rounding over cutter to cut 4mm below the top surface. Rather than cut in one pass, I did it in a number of passes slowly increasing the depth. This puts less strain on the

cutter and also leaves you with a good final finish. The leaves were then formed using the coving cutter, again doing it in several passes until the tops were flush with each other. The leaves are hinged using dedicated hinges that have a short and a long flap which enables the screws to bite into the full thickness of the top rather than anywhere near the formed edges. As with all hinge work, careful setting out is paramount. I used a 20mm straight cutter to remove most of the waste followed by a chisel to clean the corners. An 8mm cutter was used to cut the recess for the knuckle which then allowed the hinge to lie flat. Using only one screw in each flap I then joined the leaves to the fixed top. The reason for doing this is that if any adjustment is to be made there are still two other holes to insert screws in a slightly different position.

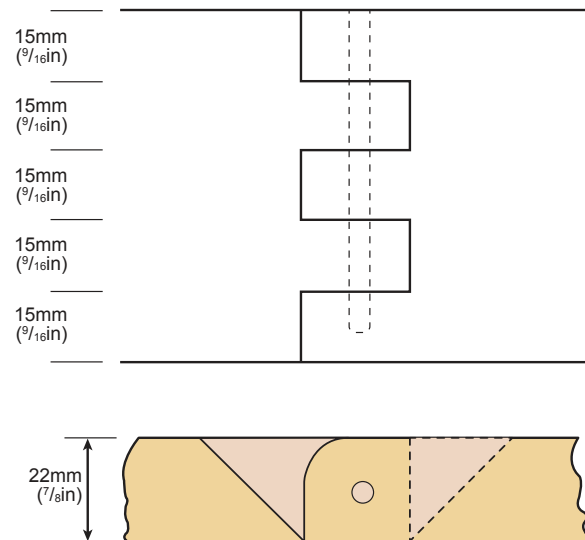
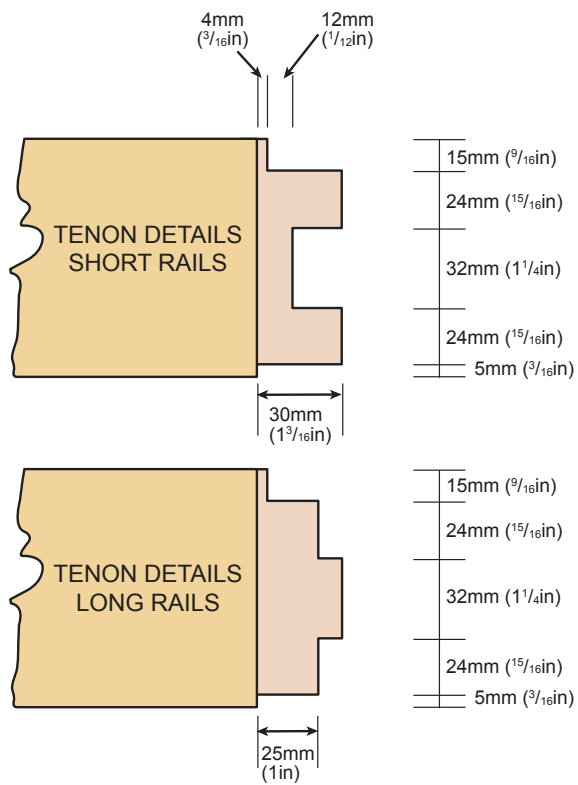
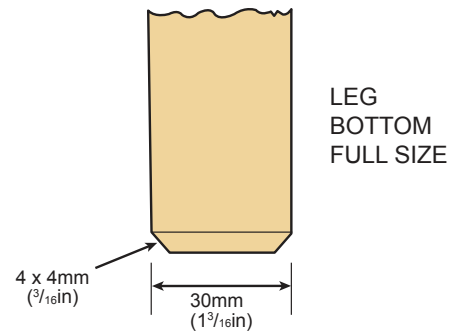
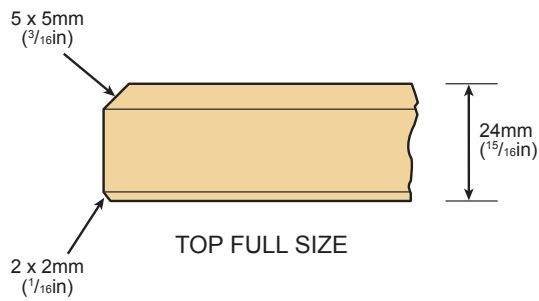
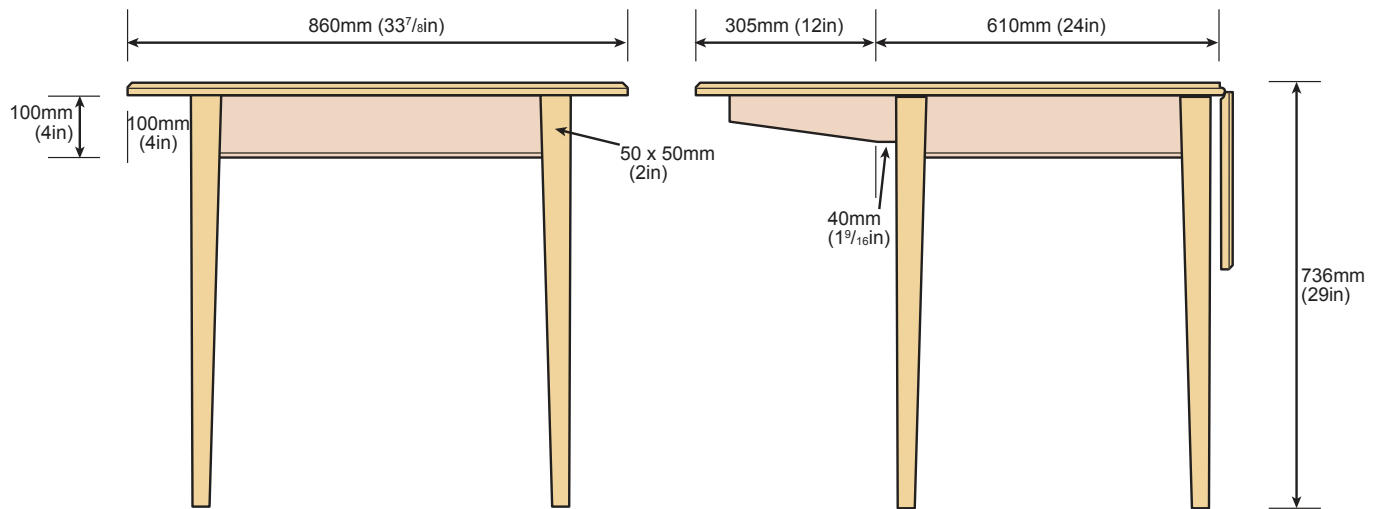
Shaping and buttons

To shape the top I simply marked out a 45° angle on each corner 50mm from the end. After sawing them off I hand planed them. With the three pieces of the top hinged, a chamfer was formed using a router around the top edge, with a smaller one on the underside. All the edges were then sanded. Using buttons, the fixed top was secured to the frame.

A small addition that is useful to consider is the fitting of a tapered stop to arrest the limit of the wings. This also has the bonus of levelling the top when extended as it takes up the natural wear on the top edge of the wings.

Finishing

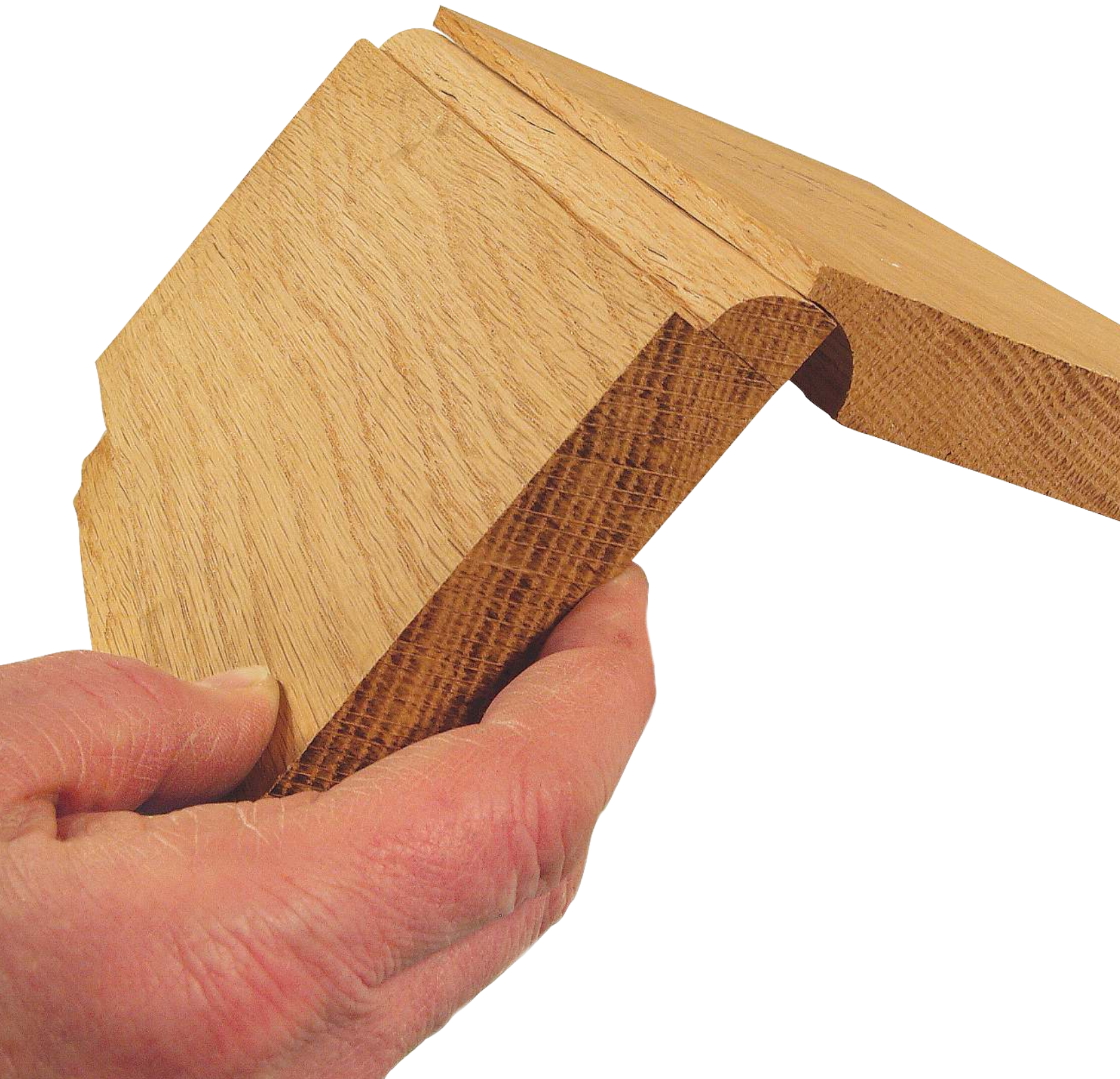
For finishing I used two coats of Danish oil for the underside applying them with a brush and then wiping off after about 10 minutes with a clean cloth and repeating 24 hours later. For the top surface I used clear Osmo oil. I applied this by wiping it on with a cloth and leaving for 24 hours, lightly sanding with 240 grit paper. This was repeated three times over three days. Over the years I have found this is an excellent finish which seems to repel almost anything normally found on a dining table.



Cutting rule joints

Rule joints are essential for drop-leaf tables.

Michael Huntley explains how to cut and fix them



If you want to make a table with flaps you need to know how to make a rule joint. This cunning joint ensures that when the flap is in the raised position there is only a minuscule gap between the leaves. Most importantly, the main leaf gives some physical support to the subsidiary leaf.

Rule joints require special hinges that must be laid correctly. These days they are usually routed but in the 16th century, from which they date, they would have been made by hand, requiring a matched pair of planes. Here I'm going for the router option. It is advisable to buy a matched pair of cutters.

CHOOSING CUTTERS

The sectional shape of the main leaf is that of an ovolo moulding. The important measurement is the radius. The little step is called a quirk. The height of the quirk can be adjusted by raising or lowering the cutter.

You do not need to set the cutter such that all the quirk cutter edge is used but it must be set such that all the radius cutter edge is used. In general the quirk should be between 3 and 4mm and the radius between 12 and 15mm, but the radius will be determined by the thickness of the top.

You can buy a cutter set that includes both the ovolo with quirk and the matching cove cutter sometimes known as a core box cutter. The cove must be exactly the same radius as the ovolo. The cove does not need a quirk; on the movable leaf the quirk is formed by not cutting so deeply into the leaf. For a wider range of radii, (i.e. for thicker tops) you might have to buy two separate cutters, one an ovolo and one a core box.

MAKING THE JOINT

Be sure to practise this joint before trying to cut it on your project. Also make sure that you have some of the correct hinges – few companies these days know what a rule joint hinge is.

You will notice that the countersinks are on the opposite side to the knuckle and that one flap is longer than the other.

This is because it is normal

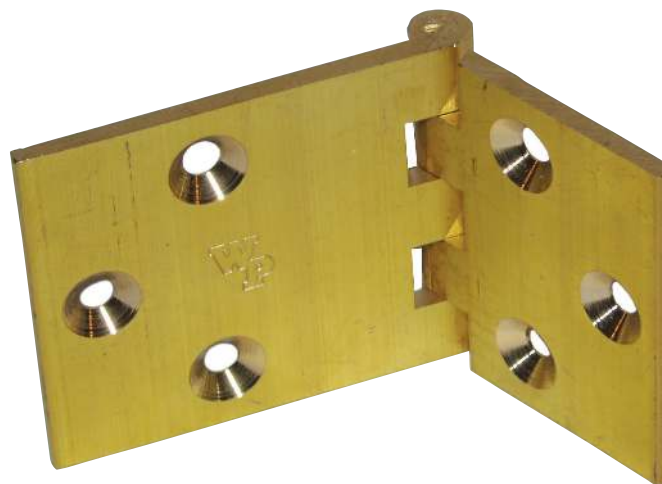
for average-size drop-flap tables to have at least three hinges, and when you use three hinges your marking out and fitting must be spot on because each knuckle must be exactly in line with the other two. Antique oak tables used blacksmith-made iron hinges with a little play in the knuckle but alas we don't have that luxury.

LAYING OUT

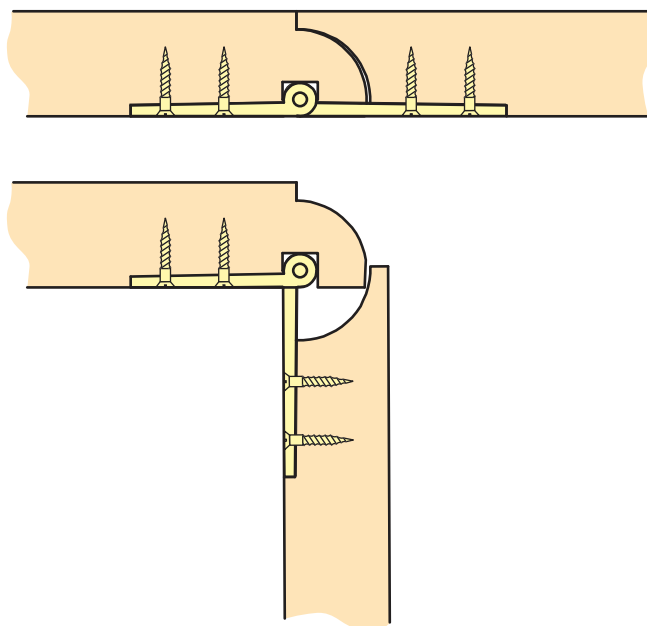
When laying out for a rule joint make sure that there is a good clearance between the underframe of the table and the point at which the leaf drops. Many tables are spoilt by the top shrinking and the drop-leaves being too close to the underframe with the result that they get forced out sideways and never hang vertically.

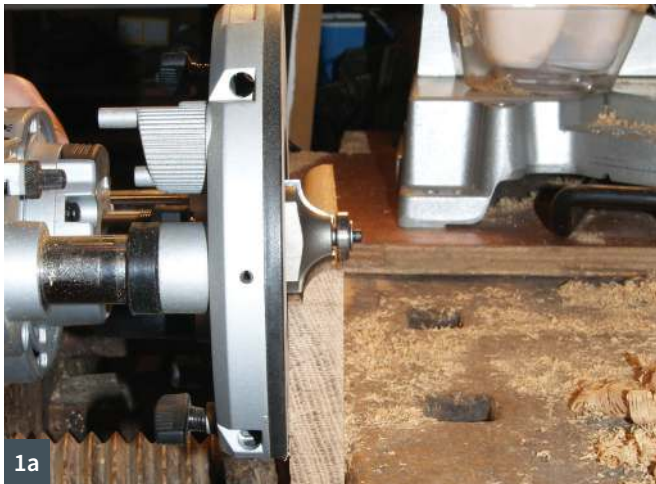


The Octacut from Trend has eight cutting profiles in one cutter



The special type of hinge used for rule joints





1a Cutting the ovolo: this test piece is set up vertically for the photo; on a large leaf this would be done horizontally. Note: guards and extraction have been removed for photography **1b** Cutting the cove **2** The cutting finished and both leaves in register **3** Chopping the knuckle recess **4** Fitting the hinge: after all this hard work, be sure to double check the screw length

CUTTING THE JOINT

- 1** The joint can be routed in two or three passes. I cut the ovolo first. This is cut on the fixed leaf and then the cove is cut to fit, in two or three passes, making fine adjustments to the depth of the cove to ensure that each leaf butts perfectly level and in register.
- 2** I also like to cut the rule joint before finally finishing the table edge. This is very important with an oval table because if you have already cut out the oval, removing the timber for the rule joint will of course leave a step in your oval. There is also a danger with these bearing-guided cutters of getting a small extra nibble out of your moulding as the cut starts and finishes. Having the leaf slightly oversize while cutting the joint gets over these problems.

HINGES AND KNUCKLES

- 3** With the joints cut the tops can be turned over and marked for the hinges and the knuckle recesses cut. If you are nervous, fit a small piece of card between the quirks to ensure a clearance gap when you are marking out; if you are brave, make it a thinner piece of card.
- 4** For setting hinges I use a router and then clean up with a chisel. Now drill pilot holes and screw the hinges in place. Check the length of the screws and if necessary nip a little off their tips.



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Mattia Migliorati makes a small piece of furniture which can help you to learn how to build large ones



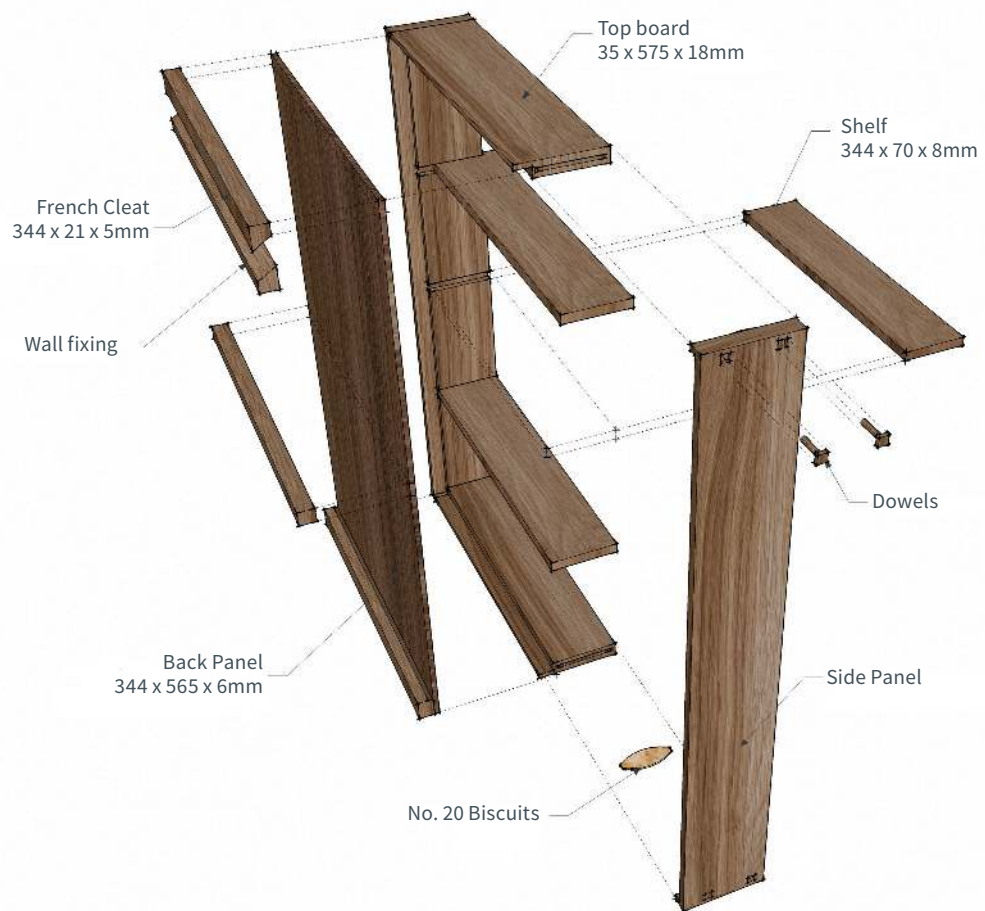
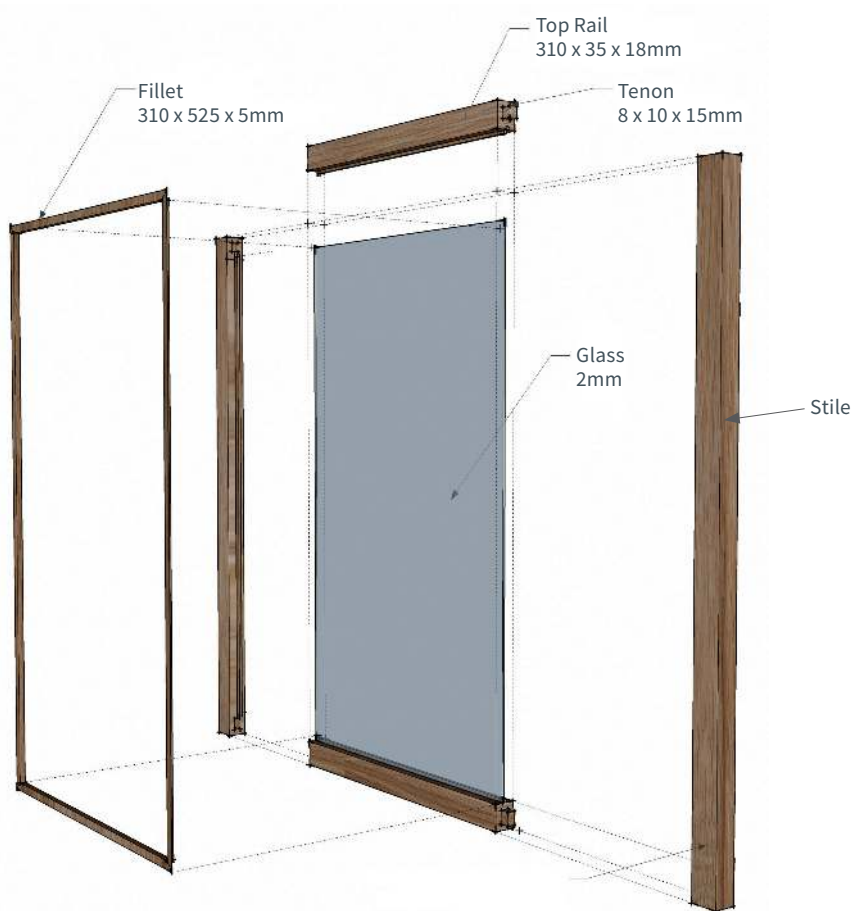
The subject of this article is a hanging display case, designed to accommodate small objects. It can be easily placed in different parts of the house, to fill empty spaces or walls that are otherwise unusable. Through its glazed doors it shows what it contains, conveying a sense of care towards 'the things' of the house, it helps to characterise and represent those who live there.

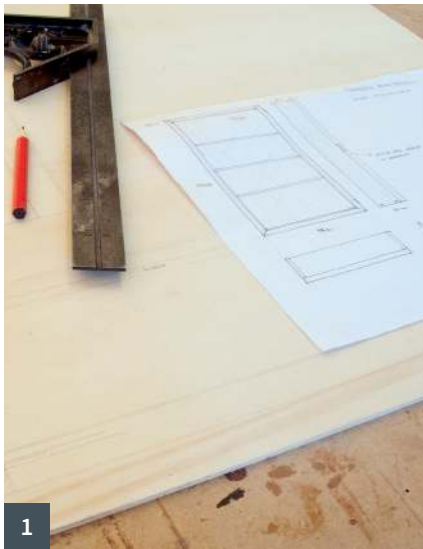
The case has a simple design: a rectangular 600 x 350 x 100mm box closed by a frame door with a glass inside. Three shelves divide the interior space and a rear cover closes the whole. I chose European oak for this project, to give the piece a natural and elegant appearance. Consistent with this basic idea, the construction of the cupboard has tried to highlight the craftsmanship of the work, in particular the

frequent use of an electric router, tablesaw and the use of a simple but effective wall hanging method.

YOU WILL NEED

- Bandsaw
- Planer
- Electro-milling machine
- Column drill
- Sander
- Hand tools
- 40mm-thick solid oak
- 2mm-thick glass





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PHOTOGRAPHS BY MATTHIA MIGLIORATI

1 The 2D construction drawings were the starting point **2** You don't need a bandsaw this big obviously, it's what I happen to have **3** The timber squared and ready to thickness, a small cabinet thicknesser is good enough **4** The stock needs ripping down so a sharp skip tooth blade is essential **5** A well set-up bandsaw will manage this, ready to re-thickness the newly sawn faces **6** The boards being brought down to final thickness to suit the design

Box construction

The box minus the front measures 600 x 350 x 80mm. To make the outer case I used 15mm thick boards while the shelves have a thickness of 8mm and a 6mm lining. Everything else was made from sections of 40mm material. The junction between the boards that make up the box uses biscuits and wooden dowels with square section heads. The shelves are in fixed positions in the sides by means of grooves. The glass front is held in a rebate in the door frame and fixed with strips of wood.

Grooving

Once the preparation of all the parts is complete, the box is held together for marking the position of the shelves. These are joined using grooves in the sides of the frame. The grooves are made with a router, straight bit and a plywood guide fixed with the clamps for a perfectly perpendicular cut. Mark one box side off the other so the grooves match exactly.

Jointing

The joints at the four corners of the box are made using a biscuit jointer

or a router and 4mm straight bit. In order to make the connection more robust, plugs are fitted by drilling two through holes in the sides at the ends of the slots for the biscuits.

Rebates

The rear of the carcass components are rebated for the back panel but stop short of the ends of the stiles (sides) and similarly for the door frame stiles in order to hold the glass.

Door frame

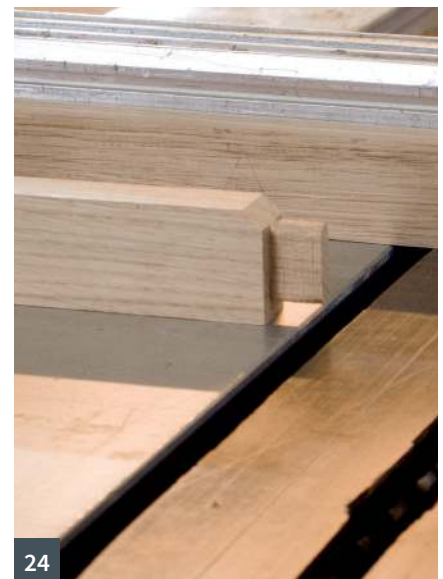
The door frame joints have a dogleg shape. This is so you end up with a neat mitre junction when the bevel is applied around the inside of the frame. Mortise and tenons give strong jointing at the corners.

Finishing

Abrasives from 120–320 grit are needed to sand the cabinet inside and out to give a good surface before oiling. You can use other kinds of oil finish but I chose lemon oil.



7 The edges need to be straight and square for gluing up into a panel **8** Marking out the design straight on to the wood **9** The box parts together with the shelf material resting on top for marking lengths **10** Setting the router position before fixing a fence for grooving the carcass **11** The fence consists of a piece of ply clamped in position **12** Drill the carcass corner dowel holes with a brad point bit in a pillar drill **13** Machining the back panel rebate using the standard fence for guidance **14** Squaring the rebate with a chisel, note the slot and dowel holes for the corner joint **15** The special dowels have square heads that plug into these holes



16 Each dowel is hand shaped from square stock of the same size as the square recess **17** Applying adhesive to the biscuit slot ready for assembly, ordinary PVA glue is OK **18** Checking the carcass is square by measuring corner to corner **19** Routing the mortises in the 40mm stock mounted on a simple holding jig **20** The bevel cut for starting the corner frame joint **21** The long grain cut completes this part of the joint **22** Measuring up the rail lengths to which the tenons must be added **23** Shaping the tenons on the bandsaw after the shoulder cuts have been made **24** The tenons are rounded with a chisel and a bevel cut to match the other joint part



25 It's hard to see, but a bevel cutter has been used to mould the inner face of the frame **26** All the frame components moulded and ready for assembly **27** Trimming the 'horns' off on the tablesaw **28** The next job is marking and fitting the hinges so they are recessed in properly **29** Setting hinge depth by placing an open hinge leaf under the router depth gauge **30** Most of the waste is removed with the router prior to chiselling square **31** Chiselling up to the fine pencil lines for a perfect hinge fit **32** Setting the hinge in place, there will be a slight gap when the door is closed **33** Drilling right through into the bottom and top panels for the dowels to fit



34 The square headed dowels are glued and tapped into place **35** The back panel needs fillets of wood to secure it in place **36** Next the glass is cut to the opening size by the glazier **37** The carcass plugs are cut flush, the paper spacer prevents the teeth from scraping **38** Rare earth magnet and steel washers are bonded in place with CA glue to give closure **39** A recessed fingerpull on the reverse of the door frame **40** A small chamfer looks better and gives comfort with no sharp edges **41** A good coating of lemon oil is applied after fine sanding all over **42** The cabinet hangs on a 'French cleat' – an angled split batten for easy fitting

A collection of various woodworking tools is scattered across a rustic wooden surface. In the top left, there's a wooden handle and a red-handled tool. In the top right, a red level is visible. On the left side, a black and red tool is partially shown. In the bottom left, a hammer with a wooden handle and a black head is prominent. In the bottom right, a large circular saw blade is visible, along with a black tool. The background is a rich, textured wood grain.

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CHOOSING AND USING SCREWDRIVERS



John Bullar tackles some of the finer points relating to the humble workshop screwdriver

Although screwdrivers are often taken for granted, they are essential for the assembly of many woodworking projects. Well-fitted hardware and the details of tidy screws confirm the quality of a piece, while using the wrong driver or using it incorrectly can lead to trouble.

Screwdrivers intended for tightening wood screws have bulbous oval handles while those for tightening machine screws have ribbed cylindrical handles. The wood screw needs steady longways pressure, applied from the ball of the hand to the ball of the handle

as it cuts its own thread in a pilot hole. It should not need the amount of torque transmitted through the ribs on a mechanic's screwdriver handle.

Wooden handles are the traditional cabinetmaker's choice and are still preferred by many. A long shaft is generally favoured as this reduces the misalignment in the screw slot caused by side-to-side movement of the handle. However, short shafts are essential when you need to fit hardware into confined spaces.



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PHOTOGRAPHS BY JOHN BULLAR

1 The bulbous handle (left) enables your hand to apply pressure to wood screws, unlike the cylindrical handle of a mechanical screwdriver (right)
2 Traditional wooden handles provide a comfortable grip **3** Short screwdriver shafts produce misalignment between the tip and the screw head caused by sideways movement of the handle

Pilots and countersinks

While modern steel screws are more than capable of boring their way through softwood – and out the other side if you are not careful – they generally look unattractive and in time they corrode.

Brass wood screws are more commonly used in hardwood furniture and these need pilot holes to be drilled, ideally shaped to match the outline of the screw shank beneath its threads.

Sometimes a steel screw of the same size is used to prepare the threads in a pilot hole ready for the more vulnerable brass screw. Lubrication with candle wax or beeswax on the threads will prevent a screw binding.

Slotted countersunk-headed wood screws work better than dome-headed ones, not only because the heads sink out of the

way, but also because they provide the screwdriver with a full-depth slot, right up to the edge.

However, the blade must be full width with chamfered corners if it is to apply the maximum purchase without gouging into the countersunk recess. Sometimes a hinge will need to be countersunk further to take the shape of the screw head.

Screws used for securing wood to wood must be carefully chosen for size. The plain section of shank beneath the head should be free to turn in the upper wood without any threads engaging in it. This way the two pieces of wood will be drawn tightly together.

After initial fitting, some makers remove screws to polish the heads on wet & dry paper or on a leather wheel before final fitting.



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4 This Japanese combined drill and countersink produces a perfectly shaped pilot hole **5** The shank must be free to turn in the upper wood so the threads pull the lower wood against it **6** Polished brass screw heads provide good detailing to quality work

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7 This screw has a thread pitch of 2mm so each half turn will sink it a full millimetre **8** Line up the slots then press the screw into the pilot hole with a clamp before starting to turn. Gauge the starting depth with a calibrated MDF spacer and align all the slots with the same torque applied to each screw



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All in line

Good-quality polished brass hinges, carefully installed, look best if the screw slots are all neatly lined up in the same direction. However, this puts woodworkers in a quandary – should they stop turning each screw when it feels suitably tight or else risk under- or over-tightening some for the sake of orderliness?

The problem occurs because wood screws are coarse and their starting position is arbitrary. For example, a typical hinge screw might have a thread pitch of 2mm. If nearly half a turn is needed to bring a slot into line, this means it will sink the screw by another millimetre, possibly tearing threads from the wood in the process.

The solution is to start all of the screws from the same height with their slots lined up too.

Firstly, drill tapered pilot holes then stand the screws in them with all their slots lined up at the same angle. Now use a clamp to press all the screws straight down a short distance into the pilot holes so the heads are all lined up in height. Use an MDF block as a spacing gauge for the height.

Now, when you turn the screws they will all tighten when their slots reach the same angle.

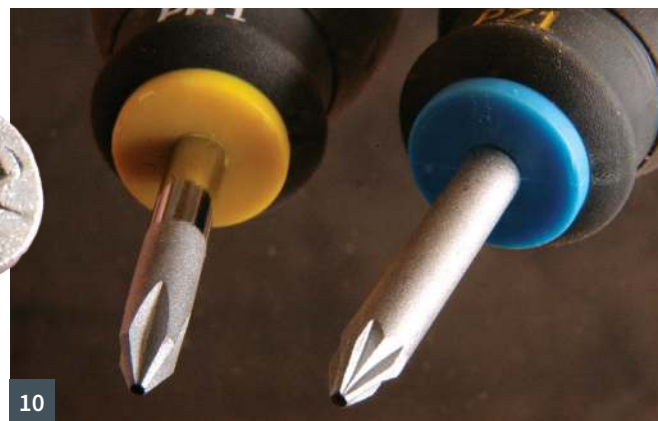
Check out this method on some scrap wood first and get the feel of it. This will allow you to calibrate the thickness of the MDF spacing gauge by shaving it down for the particular size of screws and the required slot angle.



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9 A Phillips screwdriver will not sit correctly in a Pozidriv screw head, resulting in damage to both **10** The Phillips screw head (left) has a simple cruciform-pattern head while Pozidriv (right) has an extra set of grooves at 45° **11** The Phillips screwdriver (left), colour coded yellow, has a PH number, while the Pozidriv screwdriver (right), colour coded blue, carries a PZ number

Phillips or Posidriv?

Many problems stem from people forgetting to distinguish between these two incompatible types of crosshead screw: the Phillips and the Posidriv. Each screw is perfectly good with its own driver; mix them up and both screw and driver will break down.

Socket-headed screws were developed early in the 20th century to suit the needs of mass production. The reason was that while slot-headed screws work well enough when used with care, they are not

suitable for semi-skilled workers using high-speed powered drivers.

Robertson-type square sockets and Allen-keyed hexagonal sockets make a very positive fit between screw head and driver – so positive in fact that they will often strip the thread or the shaft will be sheared off.

A good compromise was developed in Phillips crosshead screws, first used in machinery and then in woodworking. They have a positive engagement that can hold the screw on the end of the driver for

single-handed use, but the drive is easily disengaged when the operator removes pressure.

Posidriv was developed as an improved crosshead screwdriver with reduced tendency to cam-out or slip. Pozidriv uses slightly different geometry from Phillips plus an extra four shallow ribs in between the four main ones. The Posidriv screw head has an extra four shallow slots which help remind you that it is not a Phillips.

Non-slip tip

All slotted and crossheaded screwdrivers share a common tendency to slip or 'cam-out' from the head of the screw. The first precaution against this is that the shape and size of the driver tip must exactly match the screw head.

Hollow grinding the flat faces of a slotted screwdriver blade eliminates the taper between them so the blade is less likely to cam out of the slot. However, grinding down and re-shaping an old screwdriver will make the blade thinner unless you also file away some of the length.

Remember that if the blade is thinner than the slot it will only press on the corners, often damaging the slot and also jumping out of it.

Toolmakers address the wear problem on crosshead screwdriver bits with different techniques or sometimes a combination of techniques:

- Bits can be made from very hard steel, normally a chrome vanadium alloy
- They are sometimes treated with a hardening coating of titanium nitride to prevent wear from starting
- They can be treated with a hard abrasive coating, sometimes even diamond grit is used, to prevent slippage.

These are all effective to some degree but a heavily used screwdriver bit will always wear down eventually. Using a bit after it has lost its edge causes damage and frustration.

The cheapest bits are not worth risking on your finest quality work but I think it is also important not to spend so much on bits that you will resent discarding them.

Mechanical drivers

The tool designers' ingenuity has produced many special screwdrivers over the years. While some perhaps were gimmicks, certainly others are well worth owning.

The Stanley Yankee screwdriver has a built-in ratchet so the handle slips when turned backwards. It was designed to avoid the repeated release of hand pressure that often allows blades to jump from their slots. This developed into a more sophisticated Yankee that includes a double-spiral drive shaft. Like on an Archimedes' drill, a collar is slid up and down the shaft to turn the blade in one direction.

Quick-release hexagonal drive bits, as used with powered drivers, also have a significant advantage with hand-held drivers. For versatility they allow half a dozen or so bits of different sizes and types to be stored in the handle. Also, a damaged bit can be cheaply replaced. Telescopic shafts allow the driver to be used either in confined spaces or close to obstructions.

Cordless drivers

Cordless screwdrivers have been around for a few decades and they take a lot of wrist ache out of a repetitive job like screw-fitting a cabinet back. They use a high-torque motor with a hexagon drive to hold replaceable tips.

Small palm-sized versions run at low speed, relying on your grip to

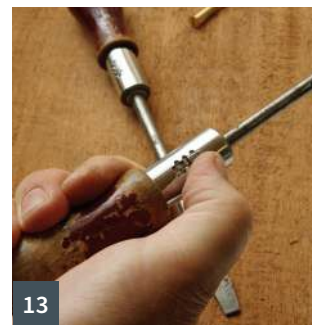
limit the torque. Larger ones run at high speed and some include an impact drive, effectively hammering the screw round as it nudges into its final position.

Older cordless designs used nickel-cadmium rechargeable batteries which quickly ran flat whether you used them or not and failed permanently if you left them discharged. Nickel-metal hydride batteries are an improvement but they still need regular use and charging to maintain their life.

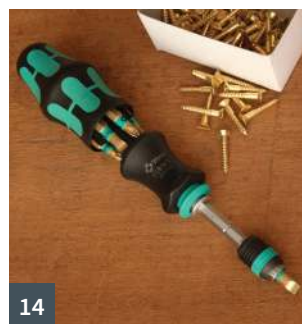
Lithium-ion batteries are a major step forward, making the cordless driver genuinely useful. They hold a good charge and they don't fail quickly, but they are expensive.



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12 Coating materials are applied by manufacturers in an attempt to harden the surface and increase friction with the screw head **13** Ratchet screwdrivers allow you to maintain continuous hand pressure without risk of the blade slipping in the slot **14** Quick-change bits, a telescopic shaft and bit storage in the handle make this a versatile tool to take on deliveries **15** As well as the motor and gearbox, inside the case of this palm driver is a sealed lithium-ion battery and electronic circuit to control the current **16** This lithium-ion powered driver has a metal gearbox with which to apply torque as a succession of impacts to the chuck

Holding the world together: THE SCREW

It may be one of the most underappreciated tools, but this small and simple accessory is not only a vital component for any repair project, it also has a fascinating history

1 The inventor of the screw

Screws were invented around 400 BC by Archytas of Tarentum, a Greek philosopher, mathematician and astronomer, who is considered the founder of mathematical mechanics. He is most famous for creating 'the first autonomous volatile machine of antiquity', the steam-powered 'Flying Pigeon'. A crater on the moon was named 'Archytas' in his honour.

2 Humble beginnings

During the early Ancient Greek era, screws were first used for extracting oils from olives and juice from grapes. Centuries later, in the Middle Ages, they were used in paper and printing machinery presses. They weren't commonly used for fastening until the mid-15th century, and they weren't just used for construction – screws were also used as fasteners in military weapons in the early 16th century.

3 Carved by hand

At that time of course, screws were still handmade; blacksmiths in England would deliver nails to farms, where entire families would painstakingly file the threading by hand. As you can imagine, production was slow, quality poor and no screws were ever identical. The cost was so high that screws were sold individually! They would not be mass-produced until the mid-19th century, and today, machines can produce hundreds of screws per minute.

4 A difficult mechanisation...

However, if there was an obvious need to cut production time and improve product quality, it wasn't an easy journey. Even though designs for a screw-cutting lathe were discovered in Leonardo da Vinci's notebooks dating from around 1500, the first machine that could produce screws automatically wouldn't be invented until the second half of the 18th century. But if this solved the refinement issue, compatibility problems then arose...

5 ... and standardisation

Sir Joseph Whitworth was the first person to create a thread standard in the mid-19th century (also known as the British Standard Whitworth or BSW). In the 20th century, however, a common standard between countries became necessary, notably when the Allies had to work together on military equipment during both World Wars. But the process is still ongoing today due to the confusion between metric and imperial screw sizes.

6 Anatomy of the screw

So why is the structure of the thread so particular? Because for the tool to be as efficient as possible, its shape has to be precise and uniform; the key is to create a perfect three-dimensional curve at a constant inclined



angle – called a helix. For this reason, the screw thread is one of the most important inventions ever made, being used for many different applications throughout history.

7 What is a helixophile?

Answer: A person who collects... corkscrews! This kitchen tool was actually adapted from a tool of war manufactured by gunsmiths, the 'gun worm', which was used to clear bullets from barrels. The basic idea of the corkscrew, then known as a 'steel worm', was born at the end of the 17th century, but inventors would file hundreds of different patents over the next 300 years.

8 Archimedes' Screw

Since ancient times, the screw thread design has been replicated at a much larger scale to lift water to higher levels. Its invention is often attributed to Archimedes, a contemporary of Archytas in ancient Greece, but it was originally used for irrigation in the Nile Delta in the 3rd century BC. It is still used for irrigation today, for example to drain flooded land in the Netherlands, but also to move grain, sand or sawdust.

9 Man versus robot

Another reason the screw is not all that it seems is in the process of screwing/unscrewing. Believe it or not, it is one of the few actions where humans still outperform machines. Despite technological progress and automation, robotic devices are still struggling to manipulate screws efficiently and apply the axial force (pushing the screw in) and the turning force required at the same time.

10 A tasty screwdriver

The equally underrated yet ubiquitous screwdriver also gave its name to one of the first vodka-based cocktails. Legend has it that in the mid-20th century, American oil workers in the Persian Gulf added vodka to their orange juice while at work. But – you guessed it – with no spoon on site they had to stir the drink with whatever they had to hand...

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