

# WOODWORKING CRAFTS

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# WOODWORKING CRAFTS

Issue 58

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## WELCOME

There is a dichotomy in woodworking – split thinking if you will. On the one hand are bright new power tools which make many operations much simpler – who would use an axe to fell a tree when a chainsaw does it so much quicker and better?

On the other hand, you might get the bug to try something simple and satisfying like knife carving, pyrography or small lathe turning. Could a traditional, textured finish – even a few visible tool markings – give your project more character than a smooth, mirrored surface that could have been made by a machine?

The new-look *Woodworking Crafts* is packed with projects,

techniques and tools to boost your skills. Whether you want to start out on the road to self-discovery with woodworking in all its various guises, learn machining techniques or restore and upcycle salvaged items, you will find something of interest in our pages.

Some things don't change. We will always need good hand skills, good hand-eye coordination and an appreciation of aesthetics: a project doesn't just need to be functional, it needs to look good too. This all takes time, patience and self-belief, so come along with us on your creative journey.



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T: +44 (0) 1273 477374

**For article submissions and editorial enquiries:**  
E: [WWCEditorial@thegmcgroup.com](mailto:WWCEditorial@thegmcgroup.com)

**Editorial** Mark Baker, Anthony Bailey,  
Christine Boggis, Karen Scott, Jane Roe  
E: [karencs@thegmcgroup.com](mailto:karencs@thegmcgroup.com)  
T: 01273 477374

**Designer** Claire Stevens

**Advertising** Lawrence Cooke, Kate O'Neill  
E: [lawrence.cooke@thegmcgroup.com](mailto:lawrence.cooke@thegmcgroup.com)

**Publisher** Jonathan Grogan

**Production manager** Jim Bulley  
T: 01273 402810

**Marketing** Anne Guillot, Laura Bird

**Printer** Poligrafijas grupa Mukusal, Latvia

**Distribution** Seymour Distribution Ltd  
T: 020 7429 4000

**Subscription enquiries:**

T: +44 (0)1273 488005

E: [pubs@thegmcgroup.com](mailto:pubs@thegmcgroup.com)

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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

If you would like to be featured in *Woodworking Crafts* please email [wwceditorial@thegmcgroup.com](mailto:wwceditorial@thegmcgroup.com)

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# WHAT IS WOOD?

This may seem a very obvious question, but how much  
do you really know about the material you craft with?

Terry Porter has the answers

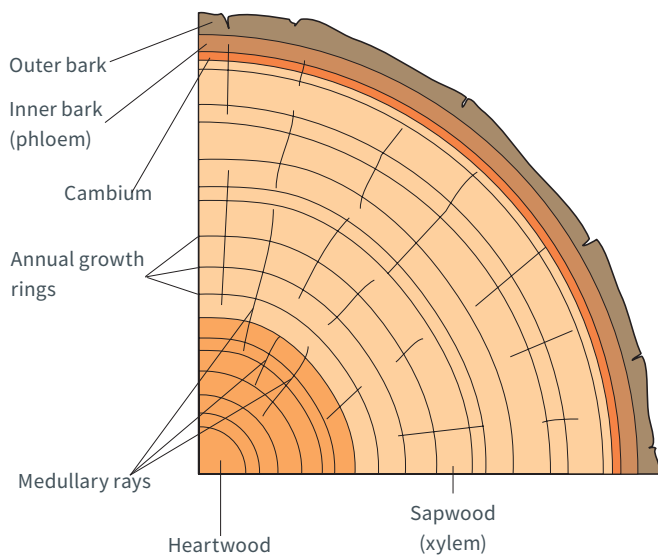
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Like all green plants, trees make the materials for their growth in their leaves by the process of photosynthesis. This is a complex chemical reaction, obtaining its energy from sunlight, in which carbon dioxide from the air combines with water from the ground to form sugars. The reaction happens in the presence of chlorophyll, the green substance that gives leaves their colour. Tiny openings in the leaves, called stomata, allow carbon dioxide to pass directly into them.

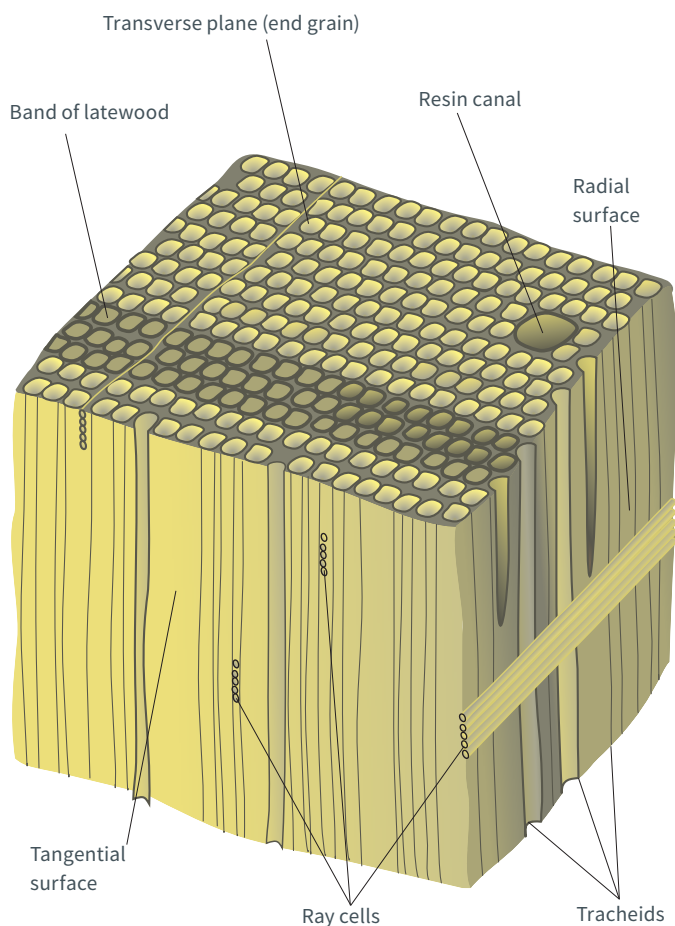
Water is drawn in via root hairs, by the process of osmosis. Osmosis is the flow of one constituent of a solution through a membrane, while other constituents are unable to pass through. The water carries in solution salts and elements essential for life, including nitrogen, potassium and phosphorus, and smaller amounts of iron, magnesium, calcium, sodium, sulphur and other trace elements. The sap then flows under pressure through the sapwood, or xylem, to the tree's crown.



*Wood Identification & Use* by Terry Porter, published by GMC publications. RRP £16.99, available online and from all good bookshops



Section of a tree trunk, showing the various layers



Schematic diagram of the structure of a typical softwood

In addition to conducting sap to the crown of the tree, wood provides the mechanical strength needed to support the crown, and stores the food created by the leaves. This food is moved in solution from the leaves to all parts of the tree through the inner bark, or phloem, and is used to generate new growth.

New wood is produced by the cambium, a specialised cell layer situated between the xylem and the phloem. The cambium completely encloses the living parts of the tree, and during times of active growth the cambial cells divide to produce new wood cells on the inside and phloem cells on the outside. Consequently, new wood is laid down on the existing core of wood. If this growth is seasonal, as in more temperate regions or during periods of drought, then the familiar annual growth rings will form. If growth is continuous, which is generally the case in tropical regions, then usually no distinct growth rings are produced.

Two key functions – sap flow and food storage – take place in the most recently formed wood, the sapwood. However, as the tree continues to grow, the innermost layer of sapwood ceases to function and the cells undergo a chemical change, becoming heartwood. The new substances produced by this change may give the heartwood its distinctive colour and form.

## CELL STRUCTURE

Wood can be described as natural material of a compound structure composed of cellulose fibres bonded together by lignin, a natural plastic. Without lignin, wood is a loose bundle of fibres; without cellulose, it is a porous sponge of lignin. In addition to the core constituents of cellulose and lignin, water is contained within the cells of the wood, and many trace elements and minerals.

An outline understanding of the cell structure helps the woodworker interpret the different properties of various woods and how they will work, bend, crush and act in service.

Unlike many other materials that are used for construction and furniture making, wood is hygroscopic – that is, it absorbs and releases moisture. The seasoning of wood is a drying process of which any woodworker should be aware; but it must always be borne in mind that wood can continue to absorb moisture at any time, especially if left unsealed. This will cause it to swell. The exterior wooden door that sticks in damp weather, but opens freely in dry weather, is a familiar example of this. It is the cell structure of the wood that really determines the nature and extent of this movement.

## SOFTWOOD CELL STRUCTURE

Softwood has two basic types of cell. About 95% of them are the long fibres known as longitudinal tracheids, which are like tubes, but taper to a close at either end. Small holes or 'pits' in each cell wall allow fluid to pass through the fibres. The size, and in particular the diameter, of these cells determines the texture of the wood, and consequently its finishing qualities and smoothness. The other 5% are the ray cells that radiate outwards from the heart and serve to convey the sap horizontally.

Some softwoods, such as larch, Douglas fir and spruce (*Larix* spp., *Pseudotsuga menziesii*, *Picea* spp.), may also have resin canals, which can be an irritation to the woodworker, but serve as a protective system in the living tree, because they transport resin to injured or damaged parts of the tree.



## HARDWOOD CELL STRUCTURE

Hardwood cell structure is much more complex than that of softwoods. There are more types of cells in hardwood, namely: vessel elements, wood fibres, parenchyma or storage cells, and rays, which are formed by parenchyma cells. The proportion of the different cells varies widely from wood to wood. The fibres in hardwoods tend to be shorter than those in softwoods.

Vessel elements are unique to hardwoods. They form a type of continuous pipeline in an end-to-end arrangement, used for transporting sap. They have relatively thin walls, and are fairly large in diameter. Their layout determines the nature of the wood, affecting its strength, drying, working qualities and appearance.

Fibres have closed ends and are the smallest in diameter of all cells. Their thick walls contribute to the strength of the wood.

The parenchyma or storage cells can be seen as a hybrid of vessel and fibre cells, and their primary role is food storage. They form the medullary rays running radially to the tree's vertical axis. The rays can be very pronounced in some hardwoods, as in the broad medullary rays of European oak (*Quercus robur*). Rays can also be the weak points in a wood: they can chip out in machining, suffer checks in drying and aid the woodchopper when splitting logs.

## EARLYWOOD AND LATEWOOD

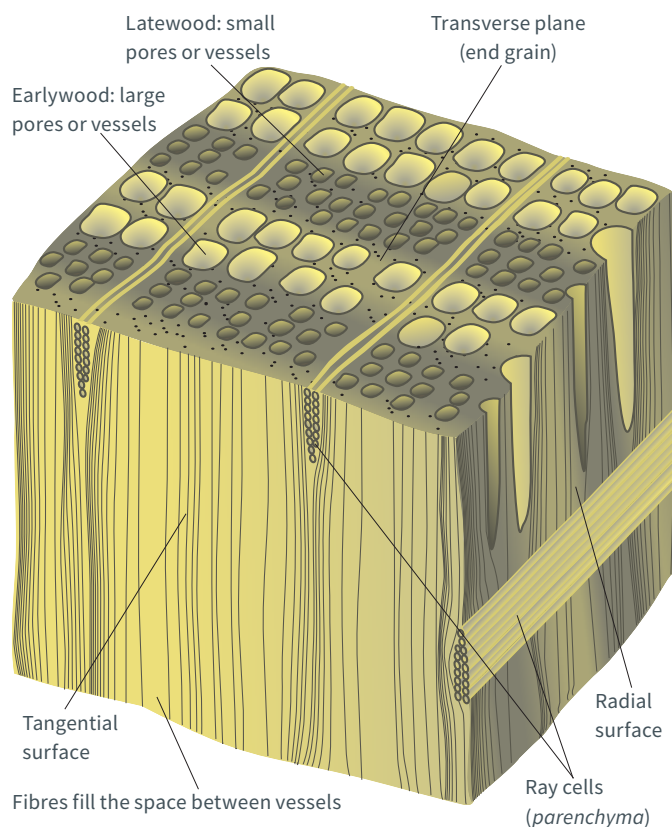
As the names imply, earlywood is formed early in the growing season and latewood later in the season. Earlywood is less dense in structure, with large, thin-walled cells for good sap transportation, whereas latewood has smaller cells with thicker walls that add strength to the tree. This pattern is characteristic of trees growing in temperate regions with distinct seasons, and produces the familiar annual rings of different densities.

## POROUS AND NON-POROUS WOODS

These terms can be a little confusing at first. They refer to the disposition of the vessel elements when cut transversely, as in cutting across the grain. The open end of the vessel is called a pore. Since softwoods do not have vessel elements, they are referred to as non-porous, whereas hardwoods are called porous. The uniformity of hardness in a wood depends on the distribution of vessels and fibres, and on their size and number. In some woods, such as ash, chestnut and oak (*Fraxinus*, *Castanea*, *Quercus* spp.), this varies, with the largest pores mostly in the earlywood, which results in uneven grain and often distinct patterns and figure. Such woods are referred to as ring-porous. In contrast, woods such as beech, birch and European sycamore (*Fagus* spp., *Betula* spp., *Acer pseudoplatanus*), in which the pores are distributed pretty evenly, are known as diffuse-porous. There is a further category, semi-ring-porous, which refers to woods where there is a difference in density between early and late growths, but it is not so pronounced and there is no clear zoning. American black walnut and butternut (*Juglans nigra*, *J. cinerea*) are good examples.

## GROWTH RINGS AND AGE

The life history of a tree is documented in the structure of its wood. Particularly if growth is seasonal, this can be seen clearly in the pattern of the growth rings. Slow-growing trees such as boxwood and yew (*Buxus sempervirens*, *Taxus baccata*) generally have very narrow rings, whereas trees that grow vigorously and rapidly, such as some pines and poplars (*Pinus*, *Populus* spp.), have much wider rings of up to 13mm a



Schematic diagram of the structure of a typical ring-porous hardwood

year. Trees that grow in parkland rather than in a forest tend to put on more growth, because there is less competition for water and nutrients. Soil fertility also plays an important role. In areas with short growing seasons, such as the Arctic or near the snow line, trees tend to have finer rings. Naturally, in periods of drought there will be less growth than in wet years. The prevailing wind and the slope of the ground can affect ring size and shape. The rings will show the experienced professional if and when the tree has been subject to fungal attack, or whether it has suffered fire damage. They will also indicate periods of vigorous or poor growth, and will show whether certain parts of the tree have ever been under tension.



Conspicuous growth rings in a stump of leylandii (*Cupressocyparis leylandii*)

In temperate regions, where growth is seasonal, the growth rings are usually clear; so a layer of less dense early growth and a layer of more dense late growth will add up to a year's total growth. The combination of these two layers makes up the annual growth ring, and from these a tree's age can be calculated, using the science of dendrochronology.

## THE BOTANICAL NAMING OF WOOD

In the timberyard and workshop, woods are normally referred to by common or commercial names, such as Norway maple, brown oak or redwood. But common names can vary from place to place, and confusion can occur. Consequently, for absolute precision in identification, botanical classification is used. This system was developed by the Swedish botanist Carl Linnaeus, in his *Species Plantarum* of 1753. Linnaeus is regarded as the founder of modern taxonomy – the science of classifying animals and plants into related groups within a larger system. The highest taxonomic division is the kingdom: living organisms are placed in either the animal or plant kingdoms. Then follows further classification into division, subdivision, order, class, family, genus and species. (Garden plants may be further divided into subspecies and varieties.) As an example, the full classification of European ash is set out below.

For general purposes the last three categories – family, genus and

species – are all the woodworker needs to know. Taking the example of European ash, the family is Oleaceae, the genus is *Fraxinus* and the species is *excelsior*. So, European ash is termed *Fraxinus excelsior*, whereas American ash, which is of the same genus but a different species, is known as *Fraxinus americana*.

Only the genus and species are used in normal nomenclature, but it is sometimes useful also to know the family. The genus and species are always given in italics, the genus with a capital letter, the species without. The genus name may be abbreviated to save space, provided it is given in full the first time it is mentioned. '*Fraxinus* sp.' stands for 'an unidentified species of the genus *Fraxinus*'; '*Fraxinus* spp.' means 'various species of the genus *Fraxinus*'.

Unfortunately, botanical names are occasionally revised, with the result that some species may be known by more than one name. The abbreviation 'syn.' (for 'synonym') is used to denote a name that is no longer current in scientific use, but may still be found in older or less scholarly sources. For example, Alaska yellow cedar was originally classified as *Cupressus nootkatensis*, but its generic name was soon changed to *Chamaecyparis*. In 2002 it was changed to *Xanthocyparis*, and in 2004 to *Callitropsis*. As far as we know, this is the accepted name at the time of going to press, but as there is no official clearing house for name changes it is difficult to be sure.

## The full classification of European ash is:

| Kingdom | Division      | Subdivision  | Order         | Family   | Genus           | Species          |
|---------|---------------|--------------|---------------|----------|-----------------|------------------|
| Plant   | Spermatophyta | Angiospermae | Dicotyledonae | Oleaceae | <i>Fraxinus</i> | <i>excelsior</i> |

## SPERMATOPHYTES

Spermatophytes are all the plants that have seeds, and there are three main types that produce material of a woody consistency: the Gymnospermae (basically the conifers), which have naked seeds and produce softwoods, such as larch and hemlock (*Larix* spp., *Tsuga heterophylla*); and the two orders of Angiospermae, with encased seeds: Monocotyledonae and Dicotyledonae. The Monocotyledonae include bamboo, palm and rattan, of tangential interest to the woodworker. The Dicotyledonae include the broad-leaved hardwoods, such as elm and mahogany (*Ulmus*, *Swietenia* spp.).



Typical needle-like leaves of a softwood tree: European larch (*Larix decidua*)

## HARDWOOD AND SOFTWOOD

Although woods classified as softwoods are generally softer than those classified as hardwoods, this can be misleading. The terms softwood and hardwood refer to a tree's botanical classification – Gymnospermae or Angiospermae, respectively. For this reason, the lightest commercial timber – balsa (*Ochroma pyramidale*) – is classified as a hardwood, while a dense wood like yew (*Taxus baccata*) is classed as a softwood.



Typical broad, veined leaves of a hardwood tree: European beech (*Fagus sylvatica*) in early autumn colouring



# Compact workbench

For David Barron it's all about 'show' when it comes to workbench building...

---



Taking my normal workbench to shows was a pain due to its size and weight, so it was time to make a more compact and portable version. Having said that, I still needed it to be rock solid for the planing, sawing and chopping I do when demonstrating hand-cut dovetails. The bench I've made here would be ideal for a compact workshop, although the dimensions could be easily scaled up for a larger version.

## MAKING THE TOP

The starting point was a large board of Iroko that I'd had for many

years; it had been planed all round and luckily had remained dead flat. One side of the board was close to quartersawn and this was ideal for using as the main part of the bench top. Traditionally this Scandinavian style of bench, with a shoulder vice, is constructed with cross grain dovetailed end caps which cover the construction detail, however if it's made from the same thickness all the way through, the bench is a lot easier to build and much more stable (see my YouTube video 'Scandinavian Work Bench Made Easy').

To achieve the 100mm bench thickness the 50mm boards are

doubled up with the aid of Dominoes for alignment. Prior to glue-up I made a hole for a threaded rod which counteracts the force of the vice; this was done on the tablesaw resulting in a square hole that is perfectly centred. Trying to drill this hole after assembly would be very difficult. As with the top, I used Dominoes to ensure the two halves of the hole lined up. This technique was used on both the main bench section and the vice spacer board. Before gluing the two together, a keeper slot for the vice jaw was cut on the table saw.

Next the front part of the vice was attached, again a pair of Dominoes were used. This also needed a hole for the threaded rod to pass and this was made on the drill press. The exact centre was found by dry-fitting the front section with slightly undersized Dominoes (for easy removal) and then inserting the threaded rod with a sharpened end.

Before gluing on the front section the internal thread or 'nut' needed to be tapped. I am lucky enough to own a 63mm wood threading kit which makes short work of both parts of the bench screw. If you don't have access to a threading kit there are a number of options available, Lake Erie Tool Works produce a beautiful wooden shoulder vice kit which is a joy to use and if you want to go top end then Rob Cosman produces a wonderful metal version. But the most practical and reasonable priced options are available from Dieter Schmid in Germany and the small 250mm model would be ideal for this bench.

The toolwell was made with two end pieces, one of which was cut at a 45° angle so that in use, shavings and debris could be more easily removed. A matching backboard was added and all three pieces were grooved on the tablesaw to receive a 12mm-thick plywood shelf.



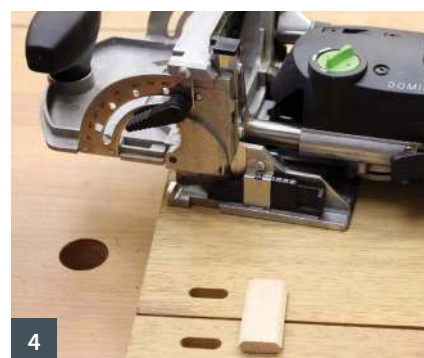
1



2



3



4



5

**1** A large board of Iroko 2.5m long x 405mm wide x 50mm thick **2** All the parts planed and cut to length **3** Square hole, cut on the tablesaw, to take the 12mm threaded bar **4** Dominoes were used at each end for alignment **5** Gluing up the top with plenty of clamps

PHOTOGRAPHS BY DAVID BARRON





## MAKING THE BASE

With the top all glued up it was time to make the base. This is an area where a lot of bench manufacturers tend to skimp, allowing movement in use, which is not good. I have long used PAR (planed all round) 100mm pine for my bases; it's strong, rigid, surprisingly heavy and cheap! OK, it may not be pretty but that's nothing two coats of milk paint won't fix. If you plan to buy some pine, don't go to a home centre and whatever you do, don't buy any that's wrapped in plastic. A local timber merchant is the best source and if they allow you to look through their boards to find the straight ones, all the better. I would allow them to settle in the workshop for at least a month before planing flat and square.

The design of the frame may look a little strange but it's carefully thought out. The end frame on the left is wider to support the vice area as well as providing lateral stability. The bottom rails are quite low, which allows me to use these as a footrest when I work sitting down at the bench, which I do a lot. The absence of a top rail at the front allows me to tuck my legs under the bench when I'm sitting down, a bit like a desk.

The ends sections are glued together – the Domino machine certainly came in useful on this project! The rails are connected with threaded rod, which makes for easy assembly and transportation

to shows. Dominoes are used for location and to keep everything in line.

## FINISHING TOUCHES

To finish the base I put shellac on all the knots to prevent bleed through and used two coats of yellow milk paint to finish. The top was finished with three coats of a penetrating oil, which really brought out the rich colour of the Iroko and gave a nice contrast with the base. The first coat was liberally applied and then 'encouraged' to penetrate with a hot air gun, a technique I learned from Bruce Luckhurst long ago.

The last job was to connect the vice jaw to the screw and for this I used a threaded insert and a bolt recessed into the jaw. The bolt needs to only allow a small movement in the jaw so that it doesn't bind, but not too tight as it must rotate freely. I used plenty of TPFPE thread tape on the bolt, which makes sure it stays put when the correct adjustment has been set. The jaw is lined with a cork rubber compound attached with double sided tape, this gives an effortless hold in use. All that remains to do is add a few well placed holes for bench stops and hold fasts.

The bench took 25 hours in total to complete and all the materials cost less than £200. I really look forward to using it to demonstrate at shows and I'm sure my back will be grateful too!

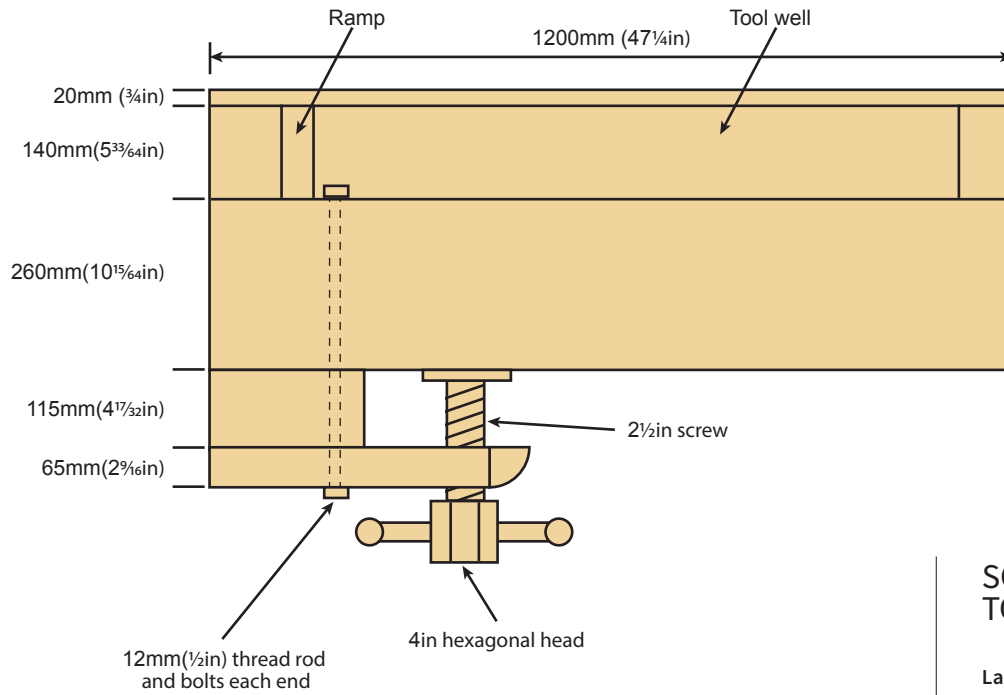




**6** Slot cut in the spacer for the vice guide **7** Grooves cut on the tablesaw, to take the base of the toolwell **8** Tapping the nut **9** The tap and die along with the resulting screw and nut **10** The completed top ready for its base **11** All the base parts planed and cut to length **12** Connecting the end frames with Dominoes **13** Gluing up the end frames **14** The completed base ready for painting **15** Using a heat gun for maximum penetration of the first coat of oil **16** The method of connecting the rails to the end frames



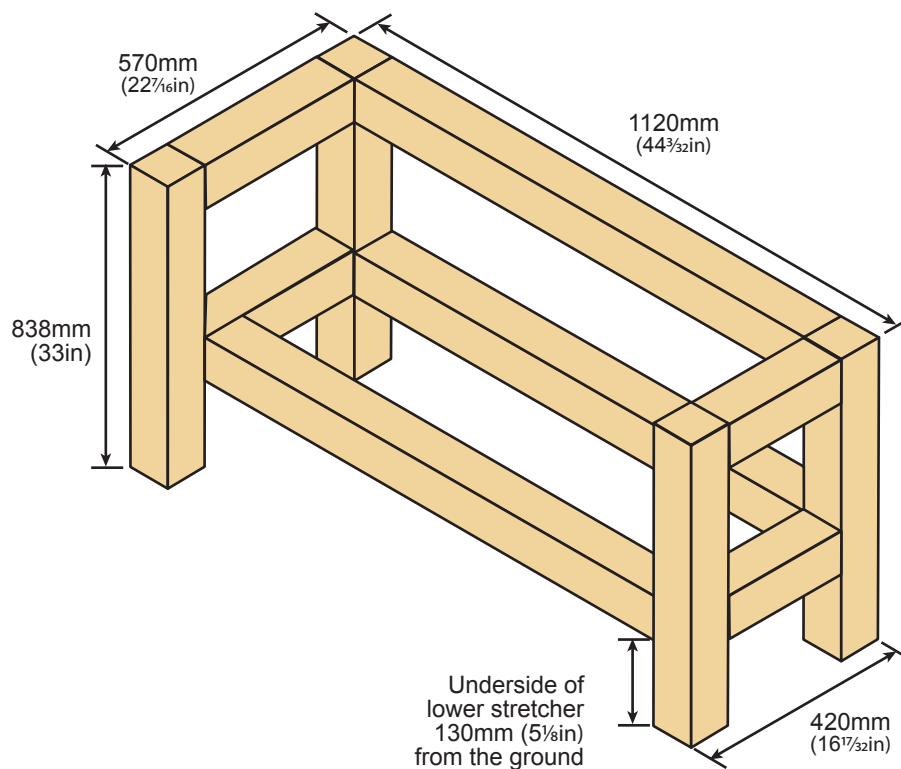
**101(4in) thick top**  
**Bench height overall**  
**940mm(37in)**



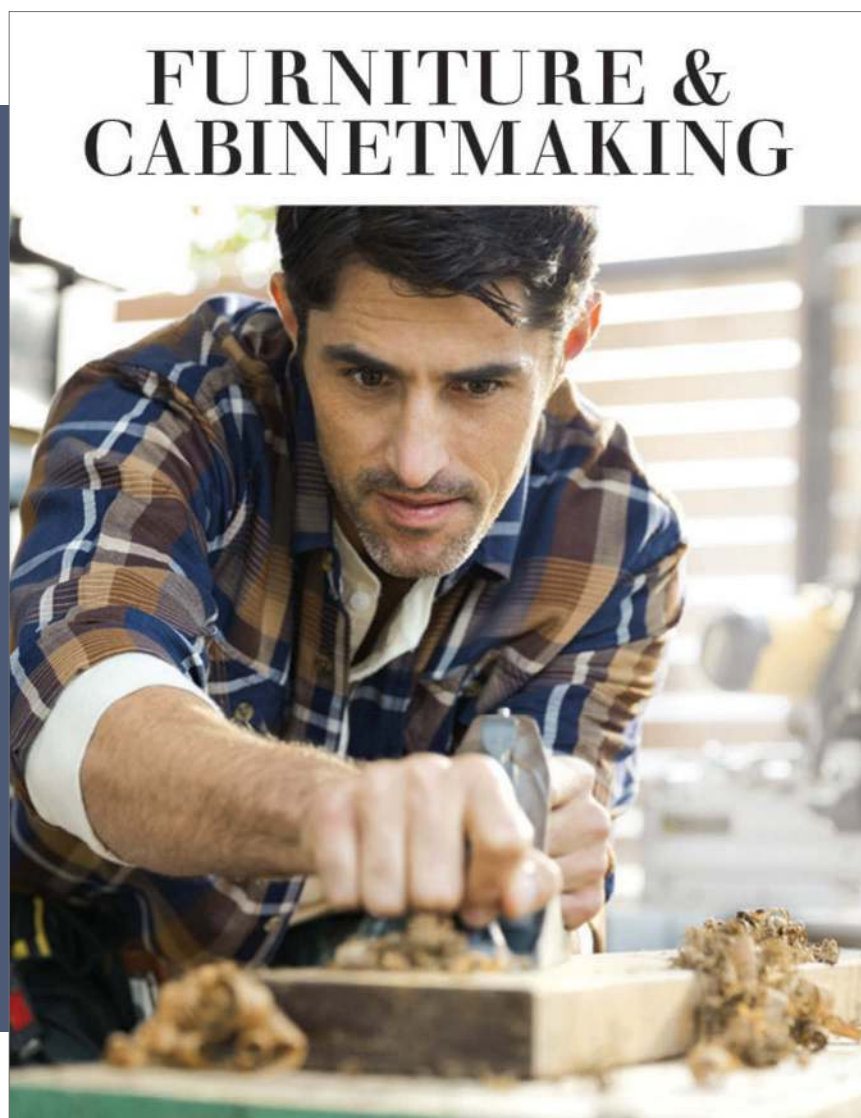
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# Improve your work space

A lick of paint, a clutter-free workbench, better lighting – discover ways to improve your wellbeing wherever you work

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You may not be consciously aware of it but your surroundings play a huge role in the way you think and feel. A series of studies suggest that how your immediate environment looks can make a big difference to wellbeing, with benefits to overall health.

One way to make a space feel better is to keep it clutter-free. Cluttered spaces can have negative consequences for wellbeing. A US study by Darby Saxbe and Rena Repetti found people living in messy homes had far slower rates of decline of the hormone cortisol – the body's main stress hormone. In a cluttered space, cortisol stays risen. This is problematic because in some cases elevated cortisol levels might interfere with learning and memory, weight, blood pressure and cholesterol levels.

Messy homes and workshops also tend to be full of unfinished projects – a shelf that needs putting up or a box that needs sanding and varnishing. The same US study found that living among unfinished projects can lead to feelings of depression and fatigue for those surrounded by stressful reminders of things still to do.

If you compare this to time spent in clutter-free spaces, the reported differences to wellbeing are huge. Research shows those who live or work in minimalist, clean-lined designs sleep better, feel more organised and in control, and are revitalised after time spent at home. Interestingly, it's estimated 28% of employers are less likely to promote someone with a messy workspace.

Ultimately, the environments in which you spend a lot of time make a big difference to the way you think and feel. Colour schemes, how tidy a space is and how it's designed, all go a long way in determining how good it feels, and therefore how much it improves, or impedes, wellbeing.

It's easy to live day-to-day, neglecting a messy workbench or putting off a redecoration, but in doing so you are missing out on the power a well-designed environment has on your happiness, and most importantly your health.

## FOUR WAYS TO IMPROVE YOUR WORKSHOP

- 1** Put aside time to reorganise your workshop. Start small, with a single shelf or a messy workbench. Properly consider whether you really need to keep that old lamp or stack of dusty magazines. Not only will tidying and decluttering make your space look better, it will also become a place where you can really relax.
- 2** Don't feel guilty about splashing out on making your space look good. You don't need to spend a fortune – there are plenty of cheap design shops – but a good quality desk light or a new storage system can go a long way when it comes to improving how a room looks, and how you feel when you spend time in it.
- 3** Add some colour by painting one or two walls in the workshop. Studies have shown that blue, green and white have a positive effect on motivation, productivity, happiness and inspiration. Blue is said to bring down blood pressure, and slow respiration and heart rate. Green is considered the most restful colour for the eye, while white represents cleanliness, and creates a cool, refreshing feeling. Repainting just one wall can make a huge difference to the overall look of a room, and it's often a cheap way to feel like you've done a bigger redecoration.
- 4** Make the most of natural light. Many studies show that workers who have a window with an attractive aspect recover from low-level stress at a much quicker rate than those who have no window. Consider moving furniture so you sit or work closer to a window. If your workshop doesn't benefit from much natural light, think about opting for a colour scheme centred around lighter hues or try hanging some mirrors on the wall – both options can make a space feel lighter, and leave you feeling brighter as well.

Words: **Olivia Lee**







# Kitchen cupboard doors revamp

Hendrik Varju uses his veneering skills in a kitchen makeover

My wife and I moved into our home almost 22 years ago. Over those years, I slowly furnished our house with my own furniture designs. We also renovated both bathrooms, painted every room, removed wallpaper, changed light fixtures, and the list goes on and on. The kitchen was one room I avoided for a long time because it involves so much work. While I did paint, change the lights and kitchen counters and even retiled the floor, I ignored the kitchen cupboards themselves. After all, how could I bring myself to hire a kitchen cabinet company when I am a furniture builder myself? Yet, how could I possibly find the time to build my own kitchen when I already work so many hours? Rebuilding the cabinets over a very long period of time doesn't sound too bad until you consider what it would be like to live without

usable cabinetry for many months on end. As soon as some other 'paid' work shows up, I might have to abandon the kitchen project for months. We all have to make a living, right?

After years of avoiding this dilemma, I finally decided it was time to do something about it, but it would have to be carefully planned. The cabinets themselves were reasonably well built and we weren't looking to totally change the layout of the kitchen, so we didn't need to move plumbing or electrical or do anything structural. And our kitchen isn't large enough to accommodate an island. In order to ease the burden of a kitchen project and reduce work required, my wife and I decided to keep the cabinets themselves. They still needed plenty of work, such as sanding, painting, new shelf liner, building a new shelf, painting the wall behind the

cabinets (the cabinets do not have full backs), plugging some holes around the plumbing, etc. Plus all the old hinge screw holes had to be filled with wood filler, sanded and painted over. The good news, though, is that the bulk of the work involved simply building new cabinet doors, drawers and crown mouldings. That was still a ton of work and I spaced it out over about a year and a half, but at least the work could be done in my workshop without affecting the usability of the kitchen for any long stretches. We lived with no cabinet doors at all for a few weeks, but that was not a hardship for us. I painted and added new shelf liner just one cabinet at a time so that we never had any significant barriers to use for more than a few hours. I have to admit that the entire job was rather seamless, at least in terms of the work done in the kitchen itself.

## THE OLD CABINETS

In the 'before' pictures below, you can see that the original cabinets were veneered in elm and the doors made of particle board with 'faux' frames glued to the front. We didn't like the handles or pulls, so all of that had to go as well. We decided on a very dark but warm espresso brown for the cabinets themselves, just to have something neutral that would contrast nicely with the new doors. And of course the old cabinets had no crown mouldings at all, which

just looked too plain to me. I wanted to design mouldings to really increase the curb appeal. Under cabinet lighting was also crucial to me. In addition to my furniture business, I run a second business called Passion for Food. I run cooking classes specialising in Mexican and Hungarian food, based on my heritage. So having proper lighting above the kitchen counters has been a thorn in my side for a very long time.



PHOTOGRAPHS BY HENDRIK VARJU

**1** A very dated kitchen but with functional carcasses **2** The other half of the kitchen – definitely time for change





**3** Detail of the frames, glazing and handles **4** Karelian birch veneer is incredibly beautiful and light in colour **5** Using a precision Dowelmax jig to create the frame joints **6** Using a rose countersink to ease the dowel entry **7** A dry alignment check of the dowel joints

## DOOR DESIGN

We decided to include a few glass panels in the doors to break up the monotony of the wood. So the four smaller doors above the fridge and stove have the same cherry frames but textured glass panels. I put the rough side of the glass inside so that the outside surface reflects light a little more while the other side obscures the view of what is inside. You can just make out that the cabinet over the stove holds wine and other glasses, while the cabinet over the fridge holds bottles of liquor.

For the rest of the doors, we opted for cherry stiles and rails but, for the front of the veneered panels, I sourced something truly unique: Karelian birch burl. I sourced this from [www.veneersupplies.com](http://www.veneersupplies.com). Karelian birch burl grows in and around northwestern Russia and Finland. These veneers can vary widely in exact patterns, but I found some that reminded me of marble or some other kind of stone. After finishing, the chattoyance is just incredible. I used makore, sometimes marketed as a version of African mahogany, on the back of the panels only because I already had some on hand and it is reasonably

priced. The beautiful thing about the cherry and Karelian birch burl combination is that the cherry will age beautifully over time, changing to a much darker red-brown, while the birch will only darken slightly. The result will be higher contrast between the two over time.

I decided to make the stiles and the upper rail the same width, at 63.5mm, while the lower rail is wider at 76mm. I've always felt that a wider lower rail looks better in a cabinet door, giving it more visual weight; 22mm thicknesses gave a substantial feel and was the maximum recommended for the Euro hinges I used. I chose to dowel all the rails and stiles to each other using my Dowelmax jig. While I do prefer mortise and tenon joinery for some projects, the 20 doors in this project would be plenty strong with dowels. I used three dowels for each upper joint and four for the lower joints, using 10mm diameter by 40mm long dowels. Given our old cabinet doors were not nearly as well built and survived over 50 years, I expect my doors will last well into the next generation and beyond. All told, I used 280 dowels and had to drill 560 holes, all by hand.





8



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11



12



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14



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**8** Using a veneer saw to cut the veneer to the same size as the door panel **9** The ripple and fine detail of Karelian birch veneer **10** The balancing veneer taped together to create the right width **11** Laying a pattern of cold pressed aliphatic resin adhesive **12** A roller is used to even out and thin the adhesive coating **13** The adhesive layer is thin enough when the pencil lines show through **14** The veneer taped in place and the vacuum bag evacuated of air **15** Random orbital sanding of the balancing veneer

## VENEERING

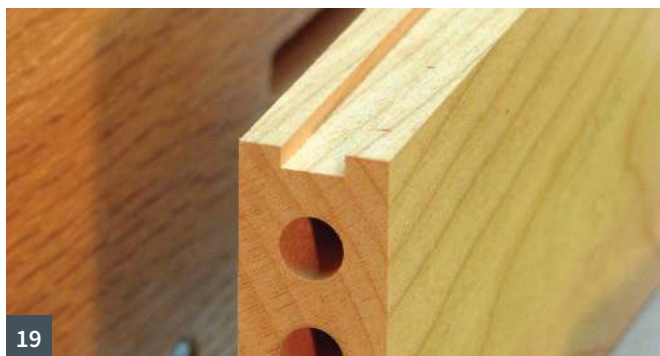
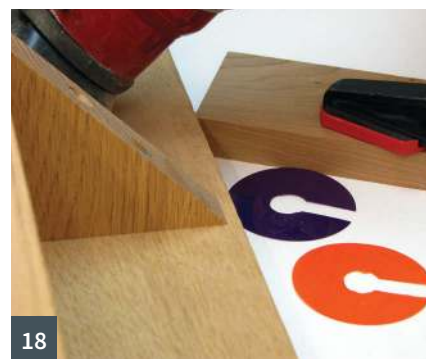
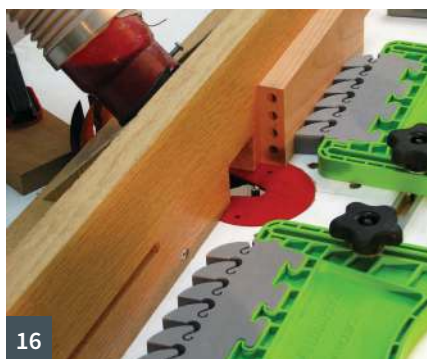
Flat vacuum bag veneering is not difficult. I started by cutting 9mm Baltic birch ply to the sizes required for the 16 doors (four doors had glass panels), leaving a little extra for a margin of error. Then I cut the veneers I needed for both sides using a veneer saw. I specifically purchased the birch burl veneers so wide that I didn't need a single joint on the front side. For the panel backs, though, the makore I had on hand was not wide enough for all panels. So I had to joint veneer edges in some cases, apply blue masking tape on the back, then veneer tape on the front. A household clothes iron run over the veneer tape dried it out quickly, pulling the joint tight. Then I could remove the blue tape from the back and get ready for gluing.

I like to draw dark pencil lines on the face of the plywood substrate. Then when I roll on the cold press veneer glue, I apply the right amount

to just barely see the pencil through the glue film. Then I lay the veneer over the glue, mist the face of the veneer with water to keep it from curling and into the veneer bag it goes, face down. Although I could veneer both sides simultaneously, I find that the bottom side always adheres more reliably given that I use breather mesh over the top instead of a full platten. So I chose to veneer just one side at a time, always putting the side being glued down on the lower platten inside the bag. However, if I worked quickly I could veneer more than one panel in the bag at a time.

I devised a special technique years ago where I only apply 17 inHg of vacuum pressure for the first 10 minutes and then I turn the vacuum pump on again until it naturally turns off at 21 inHg. This prevents glue bleed-through through the veneers by using lower pressure until the glue has thickened and begun to set up.





**16** Setting up to machine the panel slots in the stiles and rails **17** Using removable shims to increase the slot width **18** The shims removed for a second widening pass **19** The finished slots are shallow as the plywood panels will not shrink **20** The stiles need a drop-on, lift-off method to avoid slotting the joint areas **21** Slot overrun so the panel will fit in properly **22** Checking the panel fit next to the dowel joint

## PANEL GROOVES AND FINISHING TOUCHES

After all joinery was done, I used my router table to rout grooves for the panels, moving the fence over once to fine-tune the fit. While I didn't glue the panels in, I didn't have to worry about wood movement due to the plywood core. So I then trimmed the panels to be just 1.5mm smaller than the total groove-to-groove distance in both directions.

I sanded the inner edges of the stiles and rails before assembly, as well as the panel faces. Then I assembled with glue and dowels, allowing several days for the joints to dry rock hard. Next, I drilled holes for the Euro hinges and door pulls. From there I had to hand plane and sand the door faces and outer edges, ending my sanding regime at 220 grit. I also had to rout rabbets in the back of the doors with glass panels. I finished the doors with five coats of my custom Danish oil blend, which is three parts Watco natural Danish oil with one part oil-based polyurethane varnish. Roll or wipe on, wipe off the excess and allow at least 24 hours dry time between coats. I wet sand with 600 grit wet-dry sandpaper between coats and finish off with paste wax after the last

coat dries for a soft satin sheen. I secured the glass panels with a bead of brown silicone caulking.

## INSTALLATION

Installation of the doors was relatively simple, although time-consuming for 20 doors. Because the doors are overlay style over the top of painted face frames, I just needed to measure the Euro hinge screw holes properly to centre the doors over their openings and drill pilot holes. Fortunately, Euro hinges allow me to adjust in three dimensions after installation, so I could fine-tune the details after the fact. Almost all of my fine furniture designs involve inset doors and butt hinges with no room for error. So by comparison, these Euro hinges made installation a breeze even though the original cabinets had plenty of non-square corners. And the 'self-closing' design of the hinges is just fantastic. You can't slam the door if you try. The door automatically stops about one-third from closing and then silently pulls itself closed. What a sweet ending to a job well done.





**23** A good tight fit with a rubber mallet to avoid crush damage **24** Using pipe clamps for flat, tight assembly while the adhesive cures **25** The glazed doors need to have rebate routed on the reverse **26** Two pieces of wood will guide the chisel for squaring the corners **27** The finished corner ready to accommodate the rippled glass **28** Drilling for the Euro hinges with a length stop in place **29** The new doors fitted to the now dark finished carcasses **30** Glazed and veneered doors side by side



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# Spliced puzzle joint

John Bullar performs  
a woodwork miracle

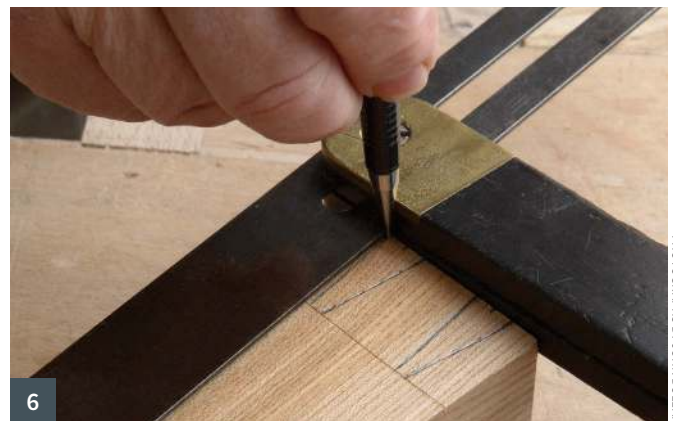
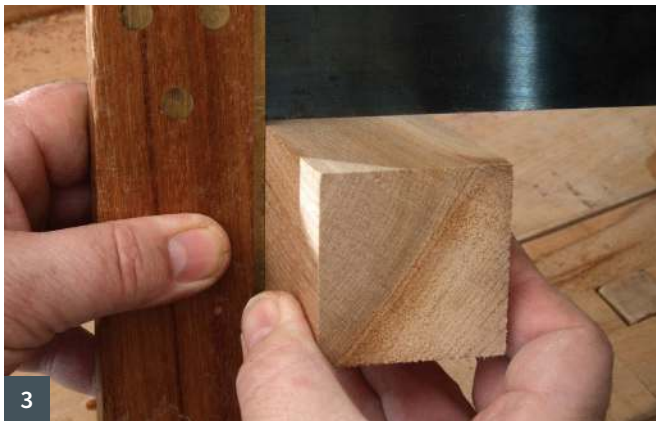
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How does this joint fit together? With a fully interlocked dovetail visible on each of its four sides, it certainly is a puzzle! Functionally, this strong joint splices the ends of two short square posts together into a longer post that might, for example, form the leg of an eye-catching coffee table.

The secret to the way the joint works is in the final stages where the joined-up post is reshaped with a plane, slicing obliquely through a straightforward pair of twin dovetails. All will be revealed!







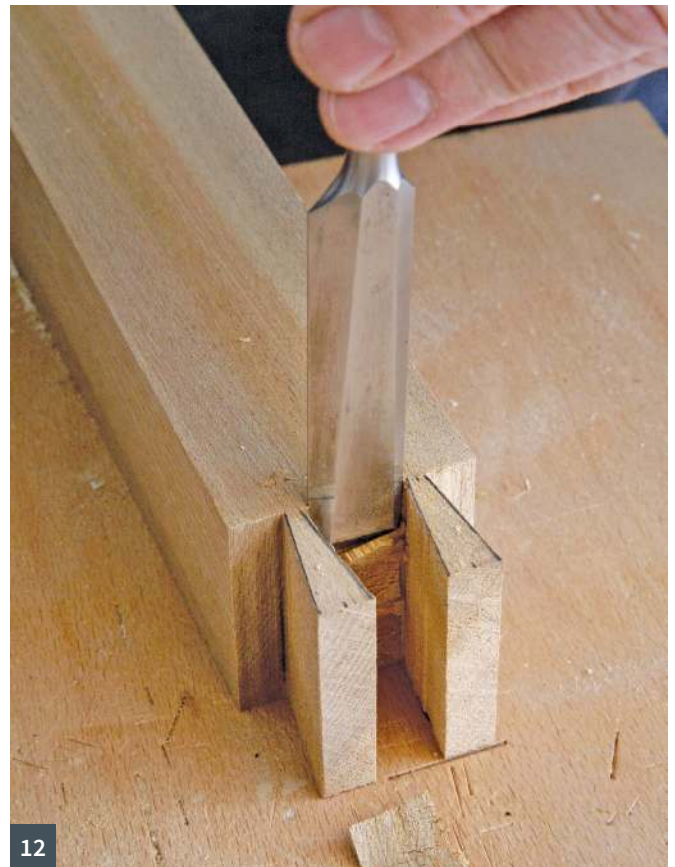
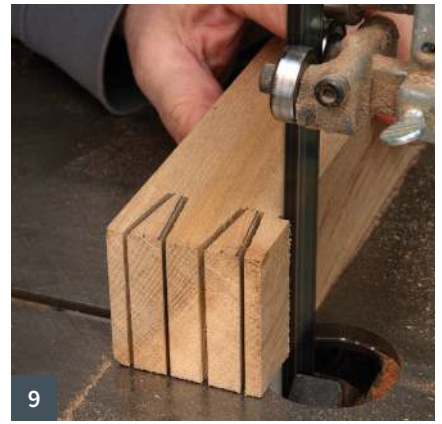
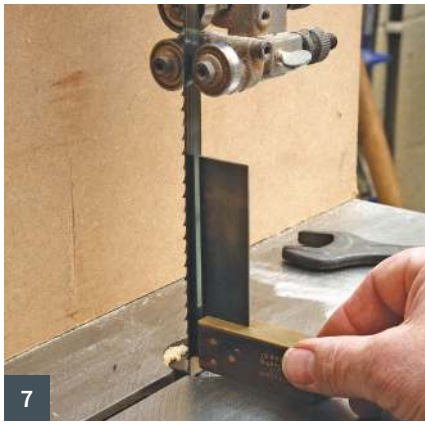
PHOTOGRAPHS BY JOHN BULLAR

## PREPARATION

- 1** Start by selecting two woods in contrasting colours, so the details of the finished joint are clearly visible. I used dark walnut and pale elm – both woods that cut crisply and form strong joints. Cut the wood into square sections, just over 40% bigger than you want the final post to end up. This allows for the final re-shaping.
- 2** For accurate joinery work, we need straight flat reference surfaces. I enjoy this stage, getting the feel of the wood with a sharp, finely adjusted plane. From bitter experience, I know that good preparation at the start of the job saves a lot of sweat and tears later on!
- 3** As well as each surface being straight and flat, they all need to be accurately square against their neighbours. Use a try-square to check this at each end of the wood. Position a light behind to reveal any glimmer of a gap between the wood and the square.

## MARKING THE JOINT

- 4** Choose which piece of wood is going to carry the tails. Mark the end with a fine pencil, dividing the face in half, then in half again to locate the centres of the twin tails. On either side of each centre, mark out the width of a tail. Use a try-square to mark a shoulder line at the base of the tails.
- 5** If you use a bevel gauge to mark the sides of the tails as I did, set it to an angle so the width to length forms a ratio of around 1:8. This may sound a shallow angle compared to normal dovetail sides, but you will see later that the final stage of this joint slices obliquely through the tails, widening their appearance. I chose long, slim, tail dimensions to allow for this.
- 6** Mark the tail sides against the bevel gauge using a fine pencil. There is no need to use knife lines at this stage, because the exact shape and position of the tail sides is not critical.



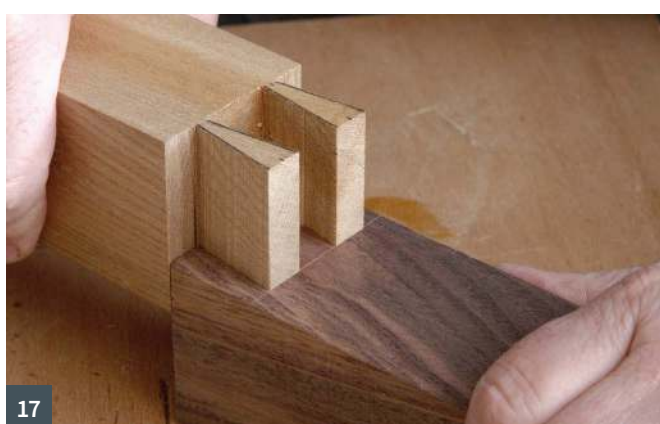
## BANDSAW WORK

- 7** A bandsaw is ideal for cutting joints like this, although you could use a dovetail saw or a small tenon saw. The sides of the joint must be cut square to the faces, so the bandsaw blade must be precisely at right-angles to the table. If need be, trim the level adjustment on the bandsaw table before making any cuts.
- 8** Saw the sides of the twin tails to follow the angled pencil lines. Remember that the kerf, or slot made by the sawblade, is wider than the pencil line. This means that the blade should run down the waste side, attempting to leave half the pencil line behind.
- 9** I also cut shoulders of the tails on the bandsaw very slowly and carefully. These are probably the most critical part of the joint – any unevenness here will convert straight into gaps in the finished joint, or else stop it closing properly.

## BETWEEN THE TAILS

- 10** I used a coping saw to cut a socket between the twin tails. You could use any small frame saw, a fretsaw or an electric scrollsaw if you have the use of one. Keep the saw cut a couple of millimetres clear of the shoulder line.
- 11** Use a bevel-edged chisel to chop the socket back towards the line. Choose the widest chisel you can find that fits the space so it practically cuts the full width. Make sure the edge is razor sharp.
- 12** When I am chopping sockets like this, I like to leave the last half millimetre. Finally, I chop this back in one go or pare it back with hand pressure on the chisel handle for a really clean edge.





## MARKING THE SOCKETS

- 13** Take the wood with the newly cut tails and, supporting the far end on a piece of scrap, lay the tails on top of the second piece of wood. Ensure that both pieces are precisely in line, ready to mark around the tails. Use a marking knife with a sharp pointed blade to reach into the gap, and mark all around each tail.
- 14** Back on the bandsaw, the sides of each socket need to be very carefully cut. Use good lighting and position yourself for a clear view of the blade. While the exact shape and size of the tails didn't matter too much, the sockets must exactly match the outline of the tails so there will be no gaps in the finished joint.
- 15** The bandsaw blade must run along the waste side of the knife line, so that the kerf formed by the blade just butts up against the line. Stop on or just before the shoulder line, so there is no risk of overshooting.

- 16** Because these sockets are narrow – half the width of the socket between the twin tails – I decided they did not need to be sawn out. A narrow bevel edged chisel chopped out each socket with a few mallet blows on each side. As before, I left half a millimetre to be carefully pared back to the line.

## FITTING THE JOINT

- 17** The moment of truth comes when you first try to engage the twin tails in the twin sockets. Don't be worried if they will not slide straight in – in fact if they do, they are probably too loose. It is quite common to need to trim a joint for a good, firm fit.
- 18** Only partially engage the joint for a trial fit – pushing it too far may cause it to break as you try to pull it apart. Once you are satisfied that the joint is going to fit, glue it up and use a clamp or a vice to finally pull it together.





## RE-SHAPING THE POST

**19** The trick now is to turn this twin dovetail into a puzzle joint. The joined-up post needs to be planed at  $45^\circ$ , removing a large number of shavings from each corner. Keep going until you convert each of the corners into a new face. At the same time, each of the old faces will be reduced in width until it forms a new corner.

**20** The job is finished when each new face of the joined-up post is equal in width, and each new corner is straight and even. Instead of showing twin dovetails, the newly angled surfaces now display a single tail on each face. You can challenge anyone to work out how this strong spliced joint fits together!



# Seeds of hope

As woodworkers, we know that biodiversity is essential for the continuance of our craft. But how can this be preserved?

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'We like to claim that where you're standing right now is the most biodiverse place on Earth. There are 2.3 billion seeds – more than 39,000 species – under your feet.' It's a mind-blowing thought, especially as we're only 16 miles from the *Woodworking Crafts* office. But then we are atop six 516sq ft cold vaults at the Millennium Seed Bank (MSB) in High Weald, West Sussex. Our guide, Oriole Wagstaff, Technical Officer of the MSB's Crop Wild Relative project, is quick to stress the claim is 'anecdotal', but it surely can't be far from the truth and it's a clear indicator of the efforts being made to safeguard the botanical health of the planet.





## WHAT IS THE MSB?

Essentially, it's a vast facility that stores and researches seeds from around the world. Located in the 500-acre grounds of Wakehurst Place, the MSB in its current form was established in 1996 with National Lottery funding from the Millennium Commission. Its roots, however, stretch back to the late 1960s and the crop science community, which developed the practice of drying, freezing and storing wild and older varieties of crop seeds, such as wheat, in case the then high-yielding domesticated versions were wiped out by new diseases or environmental changes. The hope was that these collections might contain resistant genes that would safeguard production of food crops and be invaluable for future plant breeding.

John Dickie, MSB's Assistant Head of Collections, explains: 'Botanic gardens like Kew [in west London] realised if you could do this for crop species you could do it for wild species and wild biodiversity. The beginnings of the seed bank grew from there.'

In the early years, the collection was held between Kew Gardens and Wakehurst, but the injection of cash from the Millennium Commission funded the current state-of-the-art building. Its three glass sections house laboratories, seed-preparation facilities and a public exhibition area. Under these is the vast storage facility, which is big enough to hold 30 double-decker buses and designed to last some 500 years. And it's here you'll find those 2.3 billion seeds of which Oriole boasted, secured behind half-a-metre thick concrete walls in six cold vaults (there's room for 10) that are raised off the ground, fitted with radiation, carbon monoxide monitors and water detectors, and kept at -20°C.

## WHAT DOES IT DO?

The overarching aim of the MSB is to contribute to securing the planet's biodiversity through a programme of seed collection that encompasses wild plant species from the UK and abroad. On a practical level, this means collecting, identifying, drying, cleaning, sorting, x-raying, counting, bottling, freezing and storing seeds – a process that can take months depending on the species – for analysis and ongoing research. The first phase was MSB Project, an international 10-year strategy to collect and store seeds from 10% of the world's bankable flora. This target was met in 2010. Phase 2, called the

MSB Partnership (MSBP), began the same year and hopes to safeguard 25% of the world's bankable flora by 2020. An ambitious project, it involves nearly 100 countries and territories.

'Without them we wouldn't be able to do what we do,' insists Oriole. 'It's a collaborative process. It's not a case of Kew scientists going to countries and taking [their seed collections]. The in-country teams inform our capacity by sharing their knowledge and history of each species.' The partnerships are based in developing as well as post-industrial nations and the seed collections are backed up in the country of origin as well as the MSB. Here at home, the MSB has banked 97% of the UK's native bankable flora.

This may give the impression that the MSB is akin to a museum, storing seeds out of daylight never to be seen or used again except in the event of a global catastrophe (seeds can remain viable for decades if stored correctly). The truth is it's more of a library – an active hub where, yes, seeds are safely stored, but they're also researched and made available for extraction by partner institutions, non-governmental organisations, plant scientists and breeders. John estimates that the MSB distributes around 1,200 seed samples every year for research – at the moment, the MSB is sending wild eggplant to Taiwan; wild bananas to Belgium; wild apples, carrots and peas to the US; and wild grass pea to India.

'Anyone can request seeds for use in research, restoration and re-introduction, as long as they're representing a recognised organisation,' explains Oriole. 'We want the material to be used in research that may benefit humankind and conservation of natural habitats. Last year, we sent the biggest ever export extraction – 700 collections, comprising 58 species [including a wild lentil plant from Cyprus and a wild wheat from Italy] – to the International Centre for Agricultural Research in the Dry Areas [ICARDA] in Lebanon, which specialises in agricultural research for dry areas. They'll multiply the seeds and make them available for research into areas such as drought-resistance in wheat crops.'

'It's like a global seed swap here. When we export seeds we ask if there's anything other countries want to back up here or share. That's what we did with the Taiwanese and Australian [seed banks], who both sent collections.'



ABOVE: The Millennium Seed Bank (MSB) in High Weald, West Sussex

LEFT: The MSB's work could play a vital role in preserving threatened species such as ash





Ash dieback has spread to trees across the UK



The MSB is researching strains of ash that are resistant to ash dieback

## WHY DO WE NEED TO PROTECT EARTH'S BIODIVERSITY?

Imagine if 30 years from now climate change has wiped out many of the world's cultivated food crops and everyday staples such as maize, rice, plantains, potatoes, wheat and yams have succumbed to drought or flooding; if a new virus has decimated our native forests; if agricultural development has devastated the world's rainforests and meadows.

Now imagine if you'd had the foresight to keep some of these seeds in storage – not only the domesticated ones, but also their wild relatives, which have adapted to survive hostile environmental changes and hold a much greater genetic diversity. These wild specimens could provide the material to breed new crop varieties capable of withstanding climate changes and fending off new pests, diseases, the ravages of war and unfettered agricultural development. Luckily, such foresight exists in the shape of the Norwegian Government-funded Crop Wild Relative project, which is managed by the Global Crop Diversity Trust, with the Royal Botanic Gardens, Kew, at the MSB.

Christopher Cockel, the Crop Wild Relative (CWR) Project Coordinator, explains: 'These wild relatives are robust. They're just out there, doing their thing, and have survived without any interference from humans.' That doesn't, however, mean that they aren't threatened. As part of the CWR project, 29 crops were identified as under-represented in the world's seed banks and a global collection programme instigated.

'To some extent they're threatened because they're overlooked,' says Christopher. 'They're not regarded as important. For example, in Malaysia, we're collecting wild banana relatives that have been pushed to the edge of palm-oil plantations. When land is being cleared for agriculture, anything that isn't wanted is removed and this can easily wipe out a population of wild relatives.'

No one crop is more important than another. 'They're used in different ways in different places,' adds Christopher. 'Some in the West we're familiar with – wheat, barley, oats, bananas and rice – but there are others that are less well known, such as cowpea, pigeon pea and Bambara groundnut. They're in Africa, but are perhaps underused in other places.'

Food crops are not the only vulnerable species, says John: 'Scientists at Kew estimate that a fifth of all plant species are threatened with extinction if we do nothing. It's important to get the most useful and the most threatened things into conservation first. Dryland has always been a high priority but with climate change, other plants, such as alpine species that live high up in the mountains, are increasingly at risk as are maritime vegetation and island species.'

Another priority is trees – the seeds of 3,000 tree species, among them the world's rarest, most threatened and most useful tree species – are being collected. In the UK, the MSB's National Tree Seed Project is establishing a national tree seed collection to facilitate long-term research into native trees and their conservation and management in the landscape.

'We have diseases coming through on some of our native trees – like ash dieback,' explains John. 'We want to store their genetic diversity and look for resistant strains. It might be there's natural resistance and we just have to find it and separate it.' Wild meadows could also benefit from the MSB's collection.

'We have a high representation of species from Britain's native flora, which could help once species-rich meadows in places such as Sussex and Kent whose wild flowers have been lost to agriculture or fertilizer,' says John. 'We're working with several stakeholders to try to reverse that by making available native genetic stock to recreate species-rich meadows.'

With more scientific and sociological literature emerging that people's mental and physical health can benefit from being close to natural vegetation, this is a good thing. And it's not just about us. 'If you reduce biodiversity, you reduce pollinators,' explains John. 'We need to conserve our wild eco-systems so the resilience afforded to us by nature doesn't disappear.'

*To find out more about Wakehurst Place and the MSB, go to [kew.org](http://kew.org). Details of the Crop Wild Relatives project, can be found at [cwrdiversity.org](http://cwrdiversity.org) and @CropWildRelativ*

Words: **Catherine Kielthy**



## WANT TO VOLUNTEER?

The MSB team relies on the support of around 40 volunteers, who clean and prepare collections for banking. John describes their efforts: 'They're worth something like 2-2.5 full-time equivalents, so their help is valuable. We've also had a lot of support from volunteers in collecting the UK flora. The UK is well botanised for its wild species. There are lots of enthusiastic people inside the British Isles who helped immensely in targeting and collecting our UK native species. We do give training, but a little botanical knowledge is useful.'

There's also scope in participating in citizen-science projects, such as recording butterflies. 'All that information is vital in helping the scientists identify trends of rising or falling numbers and looking at the possible causes.'

*For more information, visit [careers.kew.org](https://careers.kew.org) where you'll find volunteering opportunities as well as information about school learning programmes.*



## SOURCING SEEDS

There's no shortage of places to obtain seeds but if you are a beginner then seed company lists can seem bewildering as there is so much choice and a fair bit of jargon. A good place to start is to ask gardening friends or relatives if you can rummage through their seed tins; most of us keen gardeners have more seed than we ever get around to sowing and it lasts for years if stored in a cool, dry place.

Another approach is to look out for pop-up seed shop events. In summer these may be organised as part of a garden show or open day at a community garden. If you want veg seed, Transition Towns or allotment societies often have Seedy Sunday events but these usually take place in February. Either way you get the chance to speak to people who have a passion to grow or collect their own seed and swap or buy packets.

*If you are interested in growing wild flowers, then Royal Botanic Gardens Kew has an outreach programme, Grow Wild UK – [growwilduk.com](https://growwilduk.com). This has step-by-step advice on collecting and sowing wild flower seed, plus tips on how to organise your own seed swap party. Most seed is collected over summer to early autumn, then it can be swapped and sown autumn or spring.*

Words: **Liz Dobbs**





WORDS: RACHEL ROBERTS. PHOTOGRAPHS COURTESY OF CHARIS WILLIAMS

## WOOD REBORN

Charis Williams is helping to save the planet, one recycled piece of wood at a time while showing others how to make pieces worthy of any stylish home

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If you were to visit the Brighton home of Charis Williams – aka The Salvage Sister – you would find a testing ground for many of the upcycled objects she has made a career out of creating and selling. These include shelf brackets made from motorcycle parts, a clever aquarium sitting inside a recycled early iMac (the ones that look like a small TV set), and garden fences designed to withstand high coastal winds created entirely from pallet wood.

Charis, 36, has the anti-wastefulness gene in her blood. ‘My dad, David, grew up during World War II and lived through rationing, when everything was scarce,’ she explains. ‘He was very conscious about wastage – even to the point of rationing toilet roll – though you can imagine how my sister and I felt about that when we were teenagers! And my mum, Sandra, ran a fancy-dress shop in Brighton and I would tag along on her sourcing missions for vintage clothes.

Back home, I would see how she reinvented and repaired things.’

Most importantly, Charis developed an eye for finding unwanted treasures and the ability to envision what they could be transformed into. She also learnt essential bartering skills. But it was the astounding discovery of what happens to surplus materials at the end of big building projects which really ignited Charis’ passion for salvaging.

‘Many construction companies over-order materials by about 10%, as a margin of error and to allow for breakages and loss. Often, at the end of the build, they will have tonnes of it left, from sanitaryware to bricks,’ she says. ‘With no resource or time to sell it on eBay, what do they do to discard it? They dig a huge hole in the ground, throw it all inside and cover it up before moving onto the next job. Shockingly, this practice isn’t even illegal – the government knows all about it.’





## UPCYCLING PALLETS

Charis opened a reclamation yard in Brighton for a period of time to sell these surplus materials and found that pallets – the wooden bases used to transport all types of building goods – were available in huge quantities. The most common timber used to make them is pine, although hard wood is used for heavier-duty loads.

‘Pallet wood is often seen as the runt of the litter, because it’s pretty rough and ready,’ she says. ‘But it is incredibly versatile for upcycling because it splits easily and if you sand it down, it often has grains and knots that are really quite beautiful.’

Kitchen-building companies and timber merchants are also prime sourcing ground for free pallets, according to Charis. She says that a polite approach and a friendly smile can be all that’s needed to secure a new haul. If you can’t face that, simply look for houses on your street or neighbourhood having major work done. Odds are that there will be a skip outside with used pallets.

And today, humble pallet wood is one of the mainstays of Charis’ work. Society’s current heightened awareness about the perilous state of the planet is also leading to a marked uptake of the workshops Charis runs in partnership with the Woodstore, a popular timber reclamation yard in Brighton. ‘I’ve seen a huge difference in attitude in the last couple of years,’ says Charis. ‘When I first started out, people would ask, “Why are you using that old thing?” But now, they have a greater awareness of what upcycling is and that’s great for tackling our throwaway culture.’

Another sign of increased interest and demand, according to Charis, is the rising prices of reclaimed timber and other materials she has witnessed in recent years.



Charis finds many uses for old pine pallets, including planters, storage boxes and wall art





Charis runs popular workshops on making wooden letters and using power tools

## SALVAGE SISTER WORKSHOPS

Workshops on offer through Salvage Sister include how to make a pallet planter, an industrial-style storage box and pallet furniture to furnish your home. The beauty of the classes? You can make something from scratch in one day. One of the most in-demand workshops shows eager pupils how to make a wooden letter, number or symbol. (See the end of this article for instructions on how to make your own). Charis explains: 'It links in with the ongoing trend to use them as an ornament in your home. People like to make them as gifts, too.'

Charis also offers a beginner's class in how to use power tools, essential for the construction of most of the items produced in the workshop. And turning the stereotype of it being a male-dominated arena on its head, she reports that the split of female/male attendees is roughly 65%/35%.

'Times have changed!' she laughs. 'These are women whose parents probably didn't encourage them to do woodworking at school, thinking it was too masculine. But now they can do what they want. I also think the brevity of the workshops is an appealing factor for women, too. They don't have to commit to long courses and that suits them because they often have the responsibility of children to work around.'

The name Salvage Sister was dreamt up by a production company for Charis when she used her recycling and furniture-making skills on several TV shows, including *Fill Your House For Free*, and it stuck. With her striking red hair and edgy dress sense – she describes herself as a 'badass' who 'loves to create unusual, quality homewares with salvaged items' on her website – she appeals to those looking for a serving of cool with their recycling class.



## METALWORK

Charis also uses her wide skill set – including metal welding and most recently, blacksmithing – to make bespoke pieces for clients. A particular favourite of hers is a mannequin display cabinet she created for a vintage Brighton ice-cream parlour. Based on the trays carried in theatres by old-school usherettes, every part of the piece is recycled. The idea was sparked by a mannequin Charis found in a skip (she always has her salvage-spotting radar on and has even been known to rummage through friends' unwanted items).

'The mannequin was quite badly damaged and looked like she had been run over, but I could see potential,' Charis says. 'I used the body of that and topped it with a chalkboard "head" so they could write the ice-cream flavours on it. All of the trays are made from reclaimed wood and I even found the leather strap that keeps them secured in place on eBay. Everything had a previous life.'

Today, the unique display sits in pride of place in the ice-cream parlour, perfectly complementing the Art Deco-style window (made from reclaimed wood) that Charis also made. And Charis has only discovered fairly recently that with some of her creations she has been unwittingly tapping into the Japanese concept of wabi-sabi, the ancient sensibility that's all about celebrating imperfection in all of its forms. A perfect example of this is the tree ring she inlaid with resin and copper. This striking piece of wall art takes an imperfect object and transforms it into a beautiful piece, not by trying to hide the cracks that run through the wood, but by highlighting them.

Current commissions Charis is working on includes a 'howdy-doody' reimagining of a Lexus car seat for home use, and a retro-style lamp constructed from a recycled cricket helmet is a popular purchase on the Salvage Sister website. Ever the innovator, Charis has also produced a nifty tool to help pull pallets apart. The heavy-duty, fork-like instrument levers the strips of wood off whole, so there's minimal wastage.

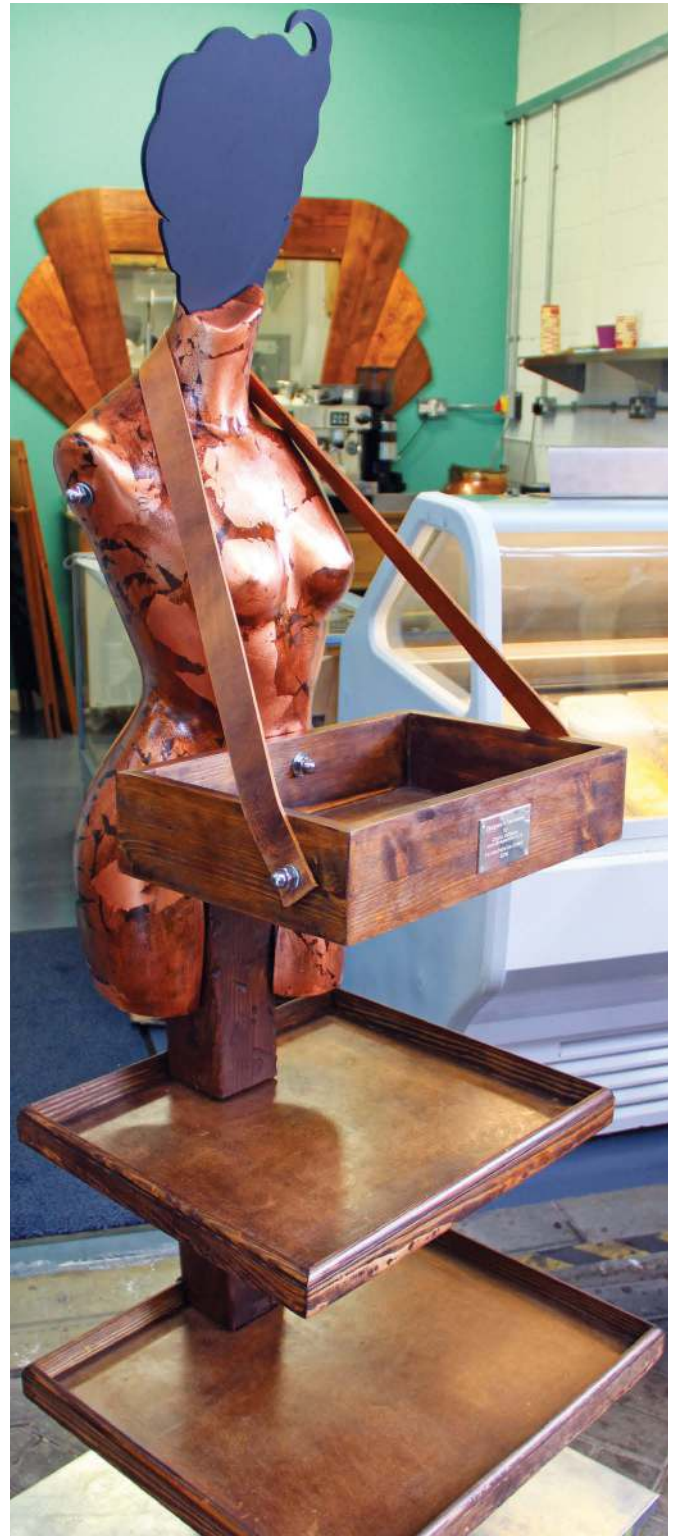
There is also a new workshop in the works to house a forge for Charis to continue developing her new passion for blacksmithing. But all the while, she's thrilled that more people are joining the movement to make things with their own hands. 'As a society,

I think we're all a bit over the mass-produced tat that is out there,' she says. 'Creating things is an intrinsic part of our nature as human beings. Holding something that you've made is just so good for the soul.'

For more information, visit [salvagesister.co.uk](http://salvagesister.co.uk) and you can follow Charis on Instagram @SalvageSisterCharis



Bench made from reclaimed wood and metalwork salvaged from the ruins of Brighton's West Pier



Usherette-style display cabinet made entirely from salvaged materials



# How to make wooden marquee letters

Put an old pallet to good use, Salvage Sister style

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## YOU WILL NEED

- MDF or ply sheet
- Circular saw
- Jigsaw
- Drill
- Pallet board

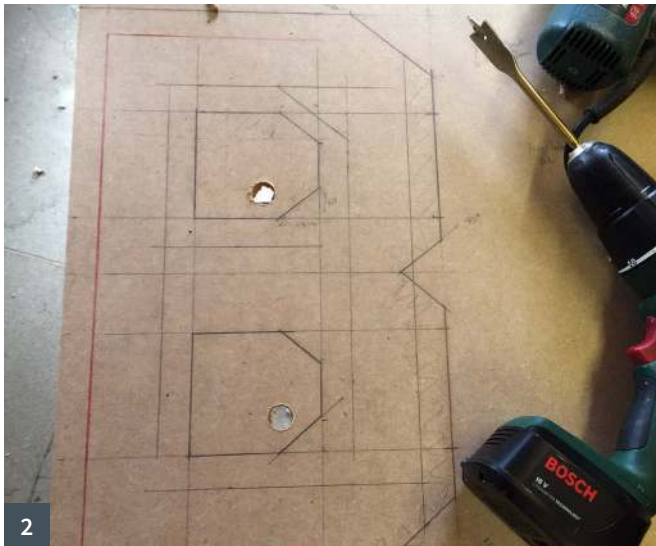


PHOTOGRAPHS COURTESY OF CHARIS WILLIAMS

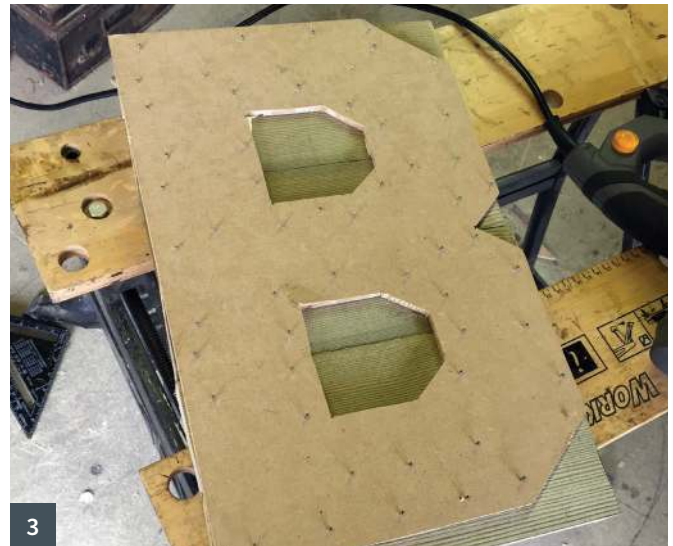


ABCDEFGHIJKLMNOPQRSTUVWXYZ

1



2



3



4



5

- 1 Choose a font to work with; you'll need this as a template. If you want to add edging, you will need a font with straight edges, not curves. However, if you are not adding edging you can curve the edges. Here are some examples of letters.
- 2 Mark out your letter on sheet material. Use MDF or ply, depending on what remnants you can find to reuse. Bear in mind if you use MDF it will swell when in contact with water. For outside or wet-area use, choose marine ply or something that won't be affected by the moisture. When marking out your letter, do it in proportion otherwise it will look strange. A 1/10 scale is a good choice – print it out and measure with a metal ruler, so each mm becomes a cm.
- 3 Once you're happy, you can cut out the template. Use a circular saw for the straight edges and a jigsaw for the parts you can't reach with the circular saw. Use a drill with a 10mm drill to make a hole to put your jigsaw blade through and cut out any interior holes if your letter has them.
- 4 Now you're ready to clad the letter. Pallet wood is always easy to find for free. Use a strong glue to stick the pallet wood slats down and clamp them in place. You can also use a pin gun at the rear to secure them further.
- 5 At this stage you can choose whether to edge or not. It's the trickiest part for beginners. Use pallet wood cut down to half its thickness (around 45mm). You can mitre the edges, and glue and pin on using clamps to secure each piece as you do.



# The perfectly imperfect

Gareth Irwin explores the different levels of finish using hand tools



PHOTOGRAPHS BY GARETH IRWIN

When many new hand tool woodworkers begin making their first pieces, it can seem like an impossible task to achieve a good surface. Many resort to electric sanders or planers to deal with difficult grain in the pursuit of perfectly flat finishes. Although this is an acceptable practice, in this article I want to explore some more traditional methods and finishes and perhaps show that not all surfaces need to be flat.

Looking at the history of hand tool made furniture, it might seem that woodworking finishes improved over time. The crude tool marks in the oldest oak pieces improved towards a greater level of refinement, which peaked sometime in the late 18th or early 19th century with huge mirror flat mahogany tables.

In reality, the early craftsmen were undoubtedly happy with the finishes they achieved, and making a perfectly flat surface probably never occurred to them (1) (2). Later carpenters chose newly imported timbers, more refined tools and French polish to achieve the glass-like finishes to suit the fashion and houses of their day.

Many of the pieces of furniture that I make are described as traditional and although the forms are often so, it is also the use

of textured finishes along with cleft timber that give them this character. Cleaving good quality logs results in the fibres of the timber laying parallel with the surface, making it fairly easy to create a smooth if textured surface.

When describing the surface of wood, in my mind surfaces can be either smooth or rough and flat or textured. Timber can be smooth and flat or smooth and textured. Timber can also be rough and flat or rough and textured.

When it comes to deciding on the level of finish that is appropriate it should be remembered that all the above have a place. A dining table needs to be smooth and quite flat, a chair, bench or chest can be smooth and textured (3). A garden table could be flat and rough (sawn timber) and a cleft post and rail fence or gait hurdle could be completely unfinished. The direction that my work has taken has meant that I rarely need to make perfectly flat surfaces. In fact, customers who come to me are looking for things that look as far from machine made as possible. This means that virtually every surface I create will have tool marks. There are a number of ways to create these.





1

A well worn old chair with a patina of age and use



2

This simple country piece exhibits tool marking



3

Subtle tool marking on a piece of cabinet furniture





## DRAWKNIFE AND SPOKE SHAVE

Legs of chairs, stools and benches are cleft from green logs and split down to near finished dimensions with an axe. Using the drawknife, several (usually six) flat facets are made, tapering from the bottom of the leg to the top. Any curve in the grain can be kept, then after leaving to season, these surfaces can be smoothed with the spoke shave and the tenon shaped at the top. The six

facets are left as smooth as silk but not necessarily flat.

If a set of straight (or not so straight) legs are required, this decision is made at the log selection and cleaving process. The straighter the growth of the timber, the straighter the leg will be.

The long back sticks, short side sticks and stretcher parts of chairs are also made in this way (4).





5 Diagonal hand planing marks



6 Light reflects off this textured surface



7 Creating a cambered blade profile



8 A variety of planes used to create different levels of finish

## RADIUS SHARPENED PLANES

When it comes to planing saws boards, hand planes with a rounded profile, i.e. the middle of the cutting edge is ahead of the corners, will create shallow, concave cuts which leave a subtle pattern. This can be applied along, across or diagonally to the grain (5).

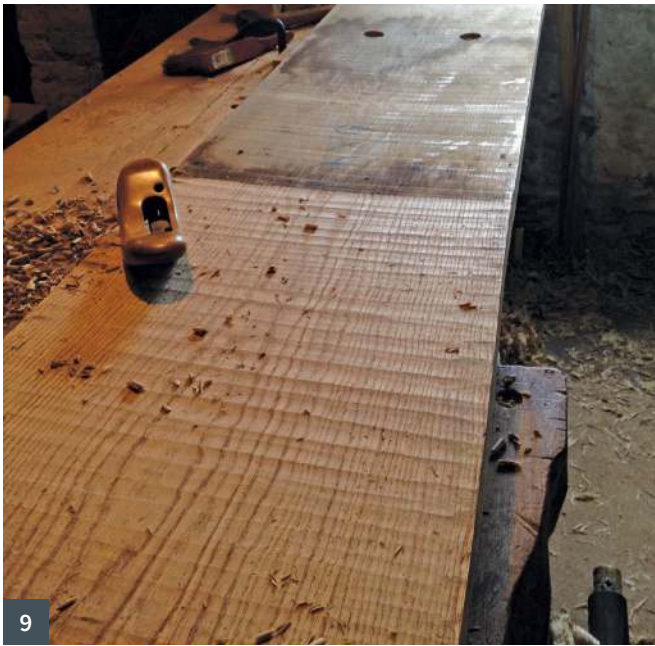
Taste aside, there are not many surfaces that need to be flatter than this. Even the tallest wine glass will stand steady on a hand-planed table and there is something especially appealing about a waxed table with the light reflecting off the surface, revealing hand plane tool marks (6).

To sharpen a plane iron to this shape, I use the figure-of-eight

method. Lay the sharpening stone left to right (as opposed to laying away from the body) then holding the blade edge parallel with the sharpening stone's length, pull the iron in a long figure of eight from side to side. As the pressure comes onto the corners of the iron as it makes the tight turns at each end of the stone, a radius or rounding will form along the blade edge but the bevel angle will be constant along its length (7).

I have scrub planes, fore planes, jack planes and smoothing planes sharpened in this way, sometimes using one or a combination to produce different depths of texture (8).





A travisher being used to texture a board



A card scraper produces a higher level of finish



The faceted effect created with a chisel

## TRAVISHER

One of my favourite textured finishes comes from the travisher. This is a traditional chair-making tool that is really a curved, bevel-up, wooden spoke shave. The wooden body can take many forms, old ones being very much like a spoke shave and modern ones varying more. The travisher is designed to smooth the dished upper surface on the seat of slab and stick chairs. Most of the hollowing or saddling is done with a curved adze, then the choppy adze marks are smoothed out with the travisher. Due to the fairly wide throat and its bevel up cut, this tool can tear out if worked along the grain so is best worked at 90° although it needs to be

turned slightly clockwise or anticlockwise, depending on the grain.

As well as chair tops, the travisher can be used to dress boards. Three or four passes, in the same place each time, will leave a pronounced rippled finish or a subtler effect can be achieved if a lighter, more spread out series of passes are made (9).

Along with the methods mentioned above, cabinet scrapers will give a very smooth finish and will follow the shape of any undulations and curves as well as working well on difficult wavy grain (10). When finishing straight board ends, a low angle bevel-up plane works well but if there are shapes in the end grain, a faceted chisel finish can be very attractive (11).



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# Choosing carving knives

Peter Benson helps you select the perfect kit to get started with woodcarving

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Blades by Nic Westermann, using homemade handles

You don't have to invest a large amount of cash in specialist kit to get started with woodcarving. In fact, you can use almost any kind of craft or pocket knife to carve as long as it will cut wood cleanly. There is a huge selection of different knives out there that will all do a very good job if kept sharp and which ones you choose are a matter of personal preference. In this article, I will look at a number of factors for you to consider.

## COMFORT

The most important point is that the knife should be comfortable in your hand with a handle that is not so thin that your fingertips

are pressed into the palm of your hand causing discomfort.

For roughing out you might like a bigger or heavier blade, whereas you could do with a narrower pointed blade for general use. Each of these work better with a shallow or flat bevel as this makes its passage through the wood much easier. For fine detail work, a smaller blade is best with a slightly curved bevel acting as a kind of depth gauge as it will generally be used to cut into the wood rather than through it. More about this later.

The reason for the general knife being slim is that you need to be able to spin the knife in a cut to get a smooth curve. Many knives, particularly those with interchangeable blades or made from thin





PHOTOGRAPHS BY PETER BENSON

Knife blades from R. Murphy in the US. On the left is the standard knife and the rest are blades modified and/or handled by carvers

flexible steel are often not only too wide at the tip but can be very difficult to sharpen if they get blunt. Choosing a slim bladed knife will pay off in the long run.

Many European knives have a very long bevel on the blade, often extending to the whole width. Avoid these for carving in any hard woods as the very thin cutting edge can easily degrade and break away. Ideally you need a blade that has a bevel that extends to about half the width of the blade giving you more strength. Those with a bevel that curves over the whole width of the blade work very well as long as the area immediately behind the cutting edge is flat, but they can be a little more difficult to strop effectively. The widest range of suitable knives

can be found in the United States and I recommend that you research the options online before buying.

## PRICE

Some knives can be quite expensive and there is no doubt that, in many cases you get what you pay for, but there is no guarantee that all knives will suit you so don't spend a lot on your first knife – work with it, play around with the design of the handle and blade until you come up with something that is ideal. Then, either buy a knife of the pattern you want or get a blade and make your own handle.

If you intend splashing out on a good knife, your best route is to buy





Pocket knives can make ideal carving knives

a really good blade and make your own handle rather than spending more than this on a knife that may not suit. Most of the blades available can easily be fitted into a drilled piece of suitable wood and secured with epoxy glue before shaping the handle to fit your hand.

Don't base your choice on the availability or advertising of knives. The fact that you see them readily available doesn't necessarily mean that they are the most suitable for you. Try a knife out before you part with any money – ask other carvers if you can try their knives or visit a woodworking show. You could even try shaping an old penknife and see what shape of blade suits you, then look for something similar. I know that it is a waste of time for me to have a knife with a curved blade as I invariably end up cutting myself, so I avoid these. Others, however, love them so the problem is only mine.

Many carvers I know use a cheap, plain knife, available from the US that they modify to suit their individual needs. The pictures on the previous pages show what can be done with some of the knives and blades from the UK and US.

## CONDITION

Once you have your knife you should be able to get carving as only occasionally should you have one that will not cut cleanly. The bevel on the blade should be flat, at least for a distance from the cutting edge. You should only need to hone, or strop this regularly to keep it in tip-top condition.

No knife is any good if it isn't kept sharp and this doesn't have to be difficult. A diamond plate is, in my opinion, the best thing for getting the bevel flat as you can see the edge at all times as no lubricant is needed. You need to use this, keeping the bevel absolutely flat until there is a small burr all the way along the cutting edge. This means that you have gone right up to the cutting edge but this edge is ragged rather

than smooth. Repeat for the other side of the blade. Then, stropping or honing on a leather or webbing strop, again keeping the bevel flat, until the burr disappears, will turn this ragged edge into a smooth, sharp edge that is needed to produce a clean cut. All that will then be necessary is to strop it after around each 20 minutes or so of use. Doing this regularly and carefully will avoid having to go back to the diamond plate for a considerable time as, once the edge is smooth, you don't really want to make it ragged again. The more you strop it, the better it should be.

## SAFETY

Finally, don't forget to get yourself a good safety glove and wear it all the time you are carving – on the hand you use to hold the wood. Many carvers wear a pair of safety gloves as it is easy to cut the thumb of the knife hand.

## KNIVES AND THE LAW

Under current UK law, it is illegal to carry a knife in public without good reason, unless it has a folding blade with a cutting edge 7.62cm (3in) long or less. It is illegal to sell a knife to anyone under 18 years old, unless it has a folding blade 7.62cm (3in) long or less. Lock knives (which can include multi-tool knives) are not classed as folding knives and are illegal to carry in public without good reason. See [www.gov.uk/buying-carrying-knives](http://www.gov.uk/buying-carrying-knives)





## CREATING WOODFOLK

Peter Benson shows how to create these festive characters with the minimum of tools

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These little fellows can be whittled anywhere. They shouldn't take too long to carve, so can become special gifts for children. Painting them is also a fun festive activity for children to do. One of my carving friends gets all his grandchildren and friends around on Christmas Eve to paint the carvings he has made, and they wouldn't miss it for the world. These little carved folk can also be used as decorations to hang on the Christmas tree.

These figures are examples of ones that can be carved from a piece of hazel cut from the garden or hedgerow.

## YOU WILL NEED

- Knife
- Safety glove
- Small V-tool
- Acrylic paint (optional)
- Hook or eye for hanging
- Finishing oil or acrylic varnish
- Liquid chalk pen



PHOTOGRAPHS BY PETER BENSON

**1** Choose a stick around 300mm long, as it is easier to hold than a shorter piece. Around 25mm in diameter is ideal, but go with what you have **2** You can plan out your pattern in advance, but I have found that these figures are easier to design as you go along. Mark where you want the hat to be and its rough design. If you get this right, the rest of the figure will be relatively easy. I have used a liquid chalk pen as pencil or pen cannot be seen against the bark. These pens are readily available and are not expensive **3** Carve the hat, leaving enough wood for the nose **4** Carve a simple face of your choosing. On this figure, I carved a Santa-type face with a moustache and beard. As the face is so small, do not try to include too much detail: keep it simple **5** Mark your stick where you intend the bottom of the carving to be, then strip off the bark down to this line. Draw in the beard and any other details you want to include





6



7



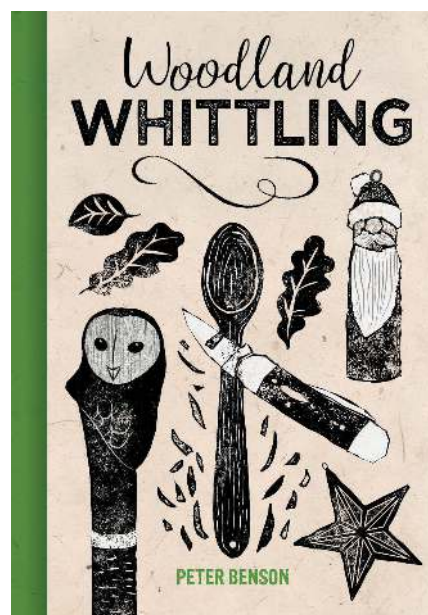
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**6** Cut back around the beard and arms if you are adding these **7** Using your small V-tool, texture the moustache and beard. Try not to use straight lines – making an elongated S-shaped cut for each line will look more natural. If you don't want to paint your figure, all that is needed is a small hook or eye screwed into the top and a coat of acrylic varnish or finishing oil **8** If you are painting the figure, use diluted acrylic paint and build up the colour gradually until you achieve the shades that you want. Don't add neat colour unless you want to cover the grain of the wood completely. When you are happy with the result, finish with a coat of acrylic varnish to protect the paintwork **9** The finished piece shown with a couple of variations



9

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## Clarke TABLE SAWS

FROM ONLY  
£72.99  
EXC.VAT  
£87.59  
INC.VAT

INCLUDES  
LEFT  
& RIGHT  
TABLE  
EXTENSION

CTS100  
MODEL MOTOR BLADE EXC.VAT INC.VAT  
CTS800B 600W 200mm £72.99 £87.59  
CTS111 1500W 254mm £149.98 £179.98  
CTS100 1500W 254mm £169.98 £203.98

Clarke  
TABLE SAW WITH  
EXTENSION  
TABLES (250mm)  
CTS14

Ideal for cross cutting  
ripping, angle and  
mitre cutting • Easy  
release/locking mechanism  
for table extensions • 0-45°  
tilting blade • Cutting depth:  
72mm at 90° / 65mm at 45°

SHOWN WITH  
OPTIONAL LEG KIT  
CLKS £19.98  
EXC.VAT  
£23.98 INC.VAT

ONLY  
£129.98  
EXC.VAT  
£155.98  
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LOCKABLE  
TAILSTOCK

BENCH  
MOUNTED

Clarke  
TABLE SAW WITH  
STAND  
CTS16

1600W motor  
• 250mm  
blade size  
• 0-45° tilting  
blade • Cutting  
depth: 73mm  
at 90° / 53mm  
at 45°

INCLUDES LEFT  
& RIGHT TABLE  
EXTENSION

ONLY  
£99.98  
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Record  
MODEL MOUNTING JAW  
(WIDTH/OPENING  
/DEPTH)mm EXC.VAT INC.VAT  
Clarke CHT152 Bolted 150/152/61 £14.99 £17.99  
Record TV75B Clamped 75/50/32 £22.99 £27.59  
Clarke WV7 Bolted 180/205/78 £29.98 £35.98

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## Clarke 4" BELT/ 6" DISC SANDER

Dust extraction facility  
4" x 36" belt tilts & locks 0-90°  
225mm x 160mm table, tilts 0-90°  
370W, 230V motor  
CS4-6E

FROM ONLY  
£96.99  
EXC.VAT  
£116.99  
INC.VAT

Clarke  
6" BELT/  
9" DISC  
SANDER

Includes stand  
1 HP/ 230V/  
1ph motor  
CS6-9C

FROM ONLY  
£259.99  
EXC.VAT  
£310.99  
INC.VAT

Clarke  
1" BELT/ 5"  
DISC SANDER

Includes 2 tables  
that tilt & lock

FROM ONLY  
£74.99  
EXC.VAT  
£89.99  
INC.VAT

Clarke  
1" BELT/ 5"  
DISC SANDER

Includes 2 tables  
that tilt & lock

FROM ONLY  
£74.99  
EXC.VAT  
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Clarke  
1" BELT/ 5"  
DISC SANDER

Includes 2 tables  
that tilt & lock

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DISC SANDER

Includes 2 tables  
that tilt & lock

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DISC SANDER

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that tilt & lock

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DISC SANDER

Includes 2 tables  
that tilt & lock

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DISC SANDER

Includes 2 tables  
that tilt & lock

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Clarke  
1" BELT/ 5"  
DISC SANDER

Includes 2 tables  
that tilt & lock

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1" BELT/ 5"  
DISC SANDER

## Clarke DUST EXTRACTOR/ CHIP COLLECTORS

CDE7B

CWVE1

FROM ONLY  
£109.98  
EXC.VAT  
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## Clarke POWER PLANERS

NEW  
RANGE

CEP450

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£34.99  
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## Clarke DETAIL SANDERS

CDS-1V

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## Clarke DRILL PRESSES

Range of precision bench  
& floor presses for enthusi-  
ast, engineering &  
industrial applications

FROM ONLY  
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## Clarke 4" BELT/ 8" DISC SANDER

Includes two  
tables • 550W  
230V motor

FROM ONLY  
£159.98  
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4" BELT/  
8" DISC SANDER

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4" BELT/  
8" DISC SANDER

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4" BELT/  
8" DISC SANDER

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8" DISC SANDER

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4" BELT/  
8" DISC SANDER

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4" BELT/  
8" DISC SANDER

Clarke  
4" BELT/  
8" DISC SANDER



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**Clarke TURBO FAN GAS HEATERS**  
Offering low cost, efficient heating

**DUAL VOLTAGE 230V/110V**  
IN STOCK FROM £226.80

**Little Devil II**  
FROM ONLY **£79.98** EXC.VAT  
PROANE GAS FIRED

| MODEL           | OUTPUT KW | MAX. VOLT | EXC. VAT | INC. VAT |
|-----------------|-----------|-----------|----------|----------|
| Little Devil II | 10.3      | 230V      | £79.98   | £95.98   |
| Devil 700       | 15        | 230V      | £99.98   | £119.98  |
| Devil 900       | 24.9      | 230V      | £139.98  | £167.98  |
| Devil 1600      | 36.6      | 230V      | £169.98  | £203.98  |
| Devil 2100      | 49.8      | 230V      | £259.00  | £310.80  |
| Devil 4000      | 131       | 230V      | £429.00  | £514.80  |

**Clarke ELECTRIC HEATERS**  
**BEST SELLER**

**DEVIL 6003**  
FROM ONLY **£49.98** EXC.VAT  
**£59.98** INC.VAT

| MODEL      | VOLTAGE | HEAT OUTPUT KW | EXC. VAT | INC. VAT |
|------------|---------|----------------|----------|----------|
| DEVIL 6003 | 230V    | 1.5-3          | £49.98   | £59.98   |
| DEVIL 7003 | 230V    | 3              | £59.98   | £71.98   |
| DEVIL 6005 | 400V    | 2.5-5          | £69.98   | £83.98   |
| DEVIL 7005 | 400V    | 5              | £84.99   | £101.99  |
| DEVIL 6009 | 400V    | 4.5-9          | £109.00  | £130.80  |
| DEVIL 6015 | 400V    | 5-10-15        | £169.00  | £202.80  |
| DEVIL 7015 | 400V    | 15             | £199.98  | £239.98  |

**Clarke BENCH BANDSAWS**

- Produces fast, precise mitre & longitudinal cuts
- 350W motor
- 7.5" throat size
- Cuts in all types of wood

**CBS190B**  
FROM ONLY **£129.98** EXC.VAT  
**£155.98** INC.VAT

**CBS300**  
FROM ONLY **£219.98** EXC.VAT  
**£263.98** INC.VAT

**Clarke MAGNIFIED MITRE GUIDE**

**QUICK RELEASE FENCE**

**DRIVE-BELT TENSIONING**

**SOLID GROUND CAST IRON TABLE**

**Clarke PROFESSIONAL BANDSAWS**  
Top Quality Bandsaws - ideal for professional workshop use. Strong steel body with solid cast iron table

- Table tilts 45°
- Adjustable blade guide
- Supplied with stand, 4TPI wood cutting blade, rip fence, mitre gauge, mitre gauge and push stick
- Induction motors
- Includes stand

**MODELS ALSO FEATURE:**

- MULTI-STEP DUST EXTRACTION OUTLET
- FLEXIBLE LED WORKLIGHT
- REMOVABLE DUST TRAY
- BLADE TENSIONING CONTROL

| MODEL  | THROAT DEPTH | MAX CUT 90° | MAX CUT 45° | EXC. VAT | INC. VAT |
|--------|--------------|-------------|-------------|----------|----------|
| CBS250 | 250mm/10"    | 100mm       | 75mm        | £219.98  | £263.98  |
| CBS300 | 305mm/12"    | 165mm       | 110mm       | £398.00  | £477.80  |
| CBS350 | 340mm/14"    | 225mm       | 160mm       | £498.00  | £597.80  |

**Clarke SLIDING COMPOUND MITRE SAWS**

- For fast, accurate cross, bevel & mitre cutting in most hard & soft woods
- 1800W motor
- Laser guide

**CMS10S2**  
FROM ONLY **£74.99** EXC.VAT  
**£89.99** INC.VAT

| MODEL     | BLADE DIA/BORER DEPTH (mm) | CROSS CUT | EXC. VAT | INC. VAT |
|-----------|----------------------------|-----------|----------|----------|
| CMS210S   | 210/30                     | 60/120    | £74.99   | £89.99   |
| C2MS210MP | 216/30                     | 65/305    | £139.98  | £167.98  |
| CMS10S2   | 254/30                     | 78/340    | £139.98  | £167.98  |
| C2MS250S  | 250/30                     | 85/250    | £109.98  | £131.98  |
| C2MS250MP | 255/30                     | 90/305    | £189.00  | £226.80  |

**Clarke SCROLL SAWS**

- 50mm max cut thickness
- Air-blower removes dust from cutting area
- Table tilts 0-45°

**CSS400C**  
FROM ONLY **£79.98** EXC.VAT  
**£95.98** INC.VAT

| MODEL   | MOTOR | SPEED RPM | EXC. VAT | INC. VAT |
|---------|-------|-----------|----------|----------|
| CSS400D | 120W  | 400-1600  | £79.98   | £95.98   |
| CSS16VB | 90W   | 550-1600  | £94.99   | £113.99  |
| CSS400C | 90W   | 550-1600  | £119.98  | £143.98  |

**Clarke STATIC PHASE CONVERTERS**

- Run big 3 phase woodworking machines from 1 phase supply
- Variable output power to match HP of motor to be run

**PC60**  
FROM ONLY **£229.00** EXC.VAT  
**£274.80** INC.VAT

| MODEL | MAX. MOTOR HP | FUSE   | EXC. VAT | INC. VAT |
|-------|---------------|--------|----------|----------|
| PC20  | 2HP           | 10Amps | £229.00  | £274.80  |
| PC40  | 3.5HP         | 20Amps | £269.00  | £322.80  |
| PC60  | 5.5HP         | 32Amps | £319.00  | £382.80  |

**Clarke ROUTERS**  
**BOSCH**

- Powerful heavy duty machines ideal for trade and DIY use

**CR4**  
FROM ONLY **£44.99** EXC.VAT  
**£53.99** INC.VAT

**CR1200**  
FROM ONLY **£131.98** EXC.VAT  
**£161.98** INC.VAT

| MODEL      | MOTOR PLUNGE EXC. VAT | INC. VAT |
|------------|-----------------------|----------|
| CR1200     | 1200 0-55             | £44.99   |
| Bosch      | 1400 0-55             | £89.98   |
| POF1400ACE | 2000 0-66             | £99.98   |
| CR4*       | 2000 0-66             | £99.98   |

**Clarke GRINDERS & STANDS**

- Stands come complete with bolt mountings and feet anchor holes
- 6" & 8" AVAILABLE WITH LIGHT

**STANDS FROM ONLY £47.98 INC. VAT**

**POLISHING KITS**  
4" to 8" FROM ONLY £27.59 INC. VAT

**# With sanding belt 8" whetstone & 6" drystone**

| MODEL   | DUTY  | WHEEL DIA.   | EXC. VAT | INC. VAT |
|---------|-------|--------------|----------|----------|
| CBG6RP  | DIY   | 150mm        | £32.99   | £39.59   |
| CBG6RZ  | PRO   | 150mm        | £42.99   | £51.59   |
| CBG6RSC | HD    | 150mm        | £54.99   | £66.99   |
| CBG6SB# | PRO   | 150mm        | £56.99   | £68.99   |
| CBG6RWC | HD    | 150mm        | £59.98   | £71.98   |
| CBG8W*  | (wet) | HD 150/200mm | £58.99   | £70.79   |

**TURBO AIR COMPRESSORS**  
**airmaster**

- Superb range ideal for DIY, hobby & semi-professional use

**8/260**  
FROM ONLY **£89.99** EXC.VAT  
**£107.98** INC.VAT

| MODEL    | MOTOR | CFM  | TANK   | EXC. VAT | INC. VAT |
|----------|-------|------|--------|----------|----------|
| 8/260    | 2HP   | 7.5  | 24lit  | £89.98   | £107.98  |
| 7/250    | 2HP   | 7    | 24lit  | £94.99   | £113.99  |
| 11/260   | 2.5HP | 9.5  | 24lit  | £109.98  | £131.98  |
| 9/550    | 2HP   | 7.5  | 50lit  | £119.98  | £143.98  |
| 11/550   | 2.5HP | 9.5  | 50lit  | £139.98  | £167.98  |
| 16/1010* | 3HP   | 14.5 | 100lit | £259.98  | £311.98  |

**Clarke PLUNGE SAWS**  
**NEW RANGE**

**CPS160**  
FROM ONLY **£69.98** EXC.VAT  
**£83.98** INC.VAT

| MODEL  | MOTOR | EXC. VAT | INC. VAT |
|--------|-------|----------|----------|
| CPS85  | 550W  | £69.98   | £83.98   |
| CPS160 | 1200W | £139.00  | £166.80  |

**Clarke ROTARY PHASE CONVERTERS**  
ALSO IN STOCK

**CONVERT 230V 1PH TO 400V 3PH**

| MODEL | MAX. MOTOR HP | FUSE   | EXC. VAT | INC. VAT |
|-------|---------------|--------|----------|----------|
| PC20  | 2HP           | 10Amps | £229.00  | £274.80  |
| PC40  | 3.5HP         | 20Amps | £269.00  | £322.80  |
| PC60  | 5.5HP         | 32Amps | £319.00  | £382.80  |

**Clarke ROUTER TABLE**  
**CRT-1**

Router not included

**BEST SELLER**

• Converts your router into a stationary router table • Suitable for most routers (up to 155mm dia. Base plate)

**£69.98** EXC.VAT  
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Professional woodworking tools and machinery from Record, Sheppach, SIP and more!

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**Clarke MULTI FUNCTION TOOL WITH ACCESSORY KIT**

- Great for sawing, cutting, sanding, polishing, chiselling & much more • 250W motor
- Variable speed

**CMFT250**  
FROM ONLY **£37.99** EXC.VAT  
**£45.99** INC.VAT

**Clarke JIGSAWS**  
**CON750**

FROM ONLY **£15.99** EXC.VAT  
**£19.99** INC.VAT

**#DIY Professional**

| MODEL          | POWER (W) | DEPTH OF CUT (WOOD/STEEL) | EXC. VAT | INC. VAT |
|----------------|-----------|---------------------------|----------|----------|
| CJS380*        | 420W      | 55/6mm                    | £15.99   | £19.19   |
| CON750#        | 750W      | 80/10mm                   | £27.99   | £33.59   |
| Bosch PST700E* | 500W      | 70/4mm                    | £44.99   | £53.99   |

**Clarke 12" DOVETAIL JIG**

- Simple, easy to set up & use for producing a variety of joints
- Cuts work pieces with a thickness of 8-32mm
- Includes a 1/2" comb template guide & holes for bench mounting

**CDTJ12**  
FROM ONLY **£54.99** EXC.VAT  
**£65.99** INC.VAT

**Clarke ROUTER TABLE**  
**CRT-1**

Router not included

**BEST SELLER**

• Converts your router into a stationary router table • Suitable for most routers (up to 155mm dia. Base plate)

**£69.98** EXC.VAT  
**£83.98** INC.VAT

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CHELTENHAM 84 Fairview Road, GL52 2EH  
CHESTER 43-45 St. James Street, CH1 3EY  
COLCHESTER 4 North Station Rd, CO1 1RE  
COVENTRY Bishop St, CV1 1HT  
CROYDON 423-427 Brighton Rd, Sth Croydon  
DARLINGTON 214 Northgate, DL1 1RB  
DEAL (KENT) 182-186 High St, CT14 6BQ  
DERBY Derwent St, DE1 2ED  
DONCASTER Wheatley Hall Road  
DUNDEE 24-26 Trades Lane, DD1 3ET  
EDINBURGH 163-171 Piersfield Terrace

01226 732297  
0121 758 7977  
0121 7713433  
01204 365799  
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01382 225 140  
0131 659 5919

EXETER 16 Trusham Rd, EX2 8QG  
GATESHEAD 50 Lobley Hill Rd, NE8 4YJ  
GLASGOW 280 Gt Western Rd, G4 9EJ  
GLOUCESTER 221A Barton St, GL1 4HY  
GRIMSBY 815 Way, DN32 9BD  
HULL 8-10 Holderness Rd, HU9 1EG  
ILFRD 746-748 Eastern Ave, IG2 7HU  
IPSWICH Unit 1 Ipswich Trade Centre, Commercial Road  
LEEDS 227-229 Kirkstall Rd, LS4 2AS  
LEICESTER 69 Melton Rd, LE4 6PN  
LINCOLN Unit 5, The Pelham Centre, LN5 8HG  
LIVERPOOL 80-88 London Rd, L3 5NF  
LONDON CATFORD 289/291 Southend Lane SE6 3RS  
LONDON 6 Kendal Parade, Edmonton N18  
LONDON 503-507 Lea Bridge Rd, Leyton, E15  
LUTON Unit 1, 326 Dunstable Rd, Luton LU4 8JS  
MAIDSTONE 57 Upper Stone St, ME15 6HE  
MANCHESTER ALTRINCHAM 71 Manchester Rd, Altrincham  
MANCHESTER CENTRAL 209 Bury New Road M8 0DU  
MANCHESTER OPENSHAW Unit 5, Tower Mill, Ashton Old Rd  
MANCHESTER D 169 Chesterfield Rd, South  
MIDDLESBROUGH Mandale Triangle, Thornaby

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# Krenov-style wall cabinet

Charles Mak uses a decorative shiplapped back to add strength, balance and beauty to this heirloom cabinet



James Krenov was a master who understood that, in his own words, 'the wood itself is not an unchanging pattern or colour, but it lives with light'. His skilful use of wood contrasts in making his Cabinet of Andaman Padouk left a lasting impression on me. To accentuate the contrast of the components, he included the use of dark and light padouk in building the cabinet and door panels, as well as choosing a light-toned pear wood for the drawer fronts. Like many others, I am drawn to his pieces for their intricate grains, attention to detail and harmony, and am inspired by his example.

In recent years, I have built several Krenov-style wall cabinets with knife-hinged doors for various storage functions. This time, I wanted to try a door-less cabinet, more as a display case. When I set out to design it, I included the element of contrast. The result was a piece that is as beautiful as it is functional, featuring such hand-cut details as the decorative beads, half-blind dovetails and one-of-a-kind drawer pull. The cabinet is designed to hang on a wall, and depending on its size, some simple mounting hardware or a French cleat system may be used.

## DESIGN

Mahogany provides the rich theme colour for the cabinet, with maple in the back and drawer front presenting a harmonious contrast. I planed all the stock thinner to keep the cabinet weight down, but there is, of course, a practical limit to how thin the slats or drawer front can be.

Domino joinery was chosen for its simplicity, though Krenov might have used dowels, if not dovetails, for this kind of carcase in his time. For the back, I chose to bead the tongue-and-groove joinery to add a touch of elegance and the extra effort proved worth it. I made the slats uniform in width for visual balance, and I also limited the number of shelves so the slatted back can be seen and admired.

Drawer joinery is a gauge of quality (isn't it usually the first thing we furniture makers will want to check?). The drawer features an orthodox joinery: hand-cut half-lap or half-blind dovetails for the front and through dovetails for the back, with grooves ploughed around for the bottom. The board for the front was selected for its wild grain character, and lastly, a distinctive but discreet drawer pull that invites the onlooker to open the drawer was added.

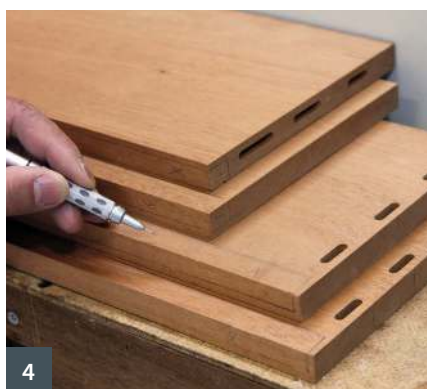
## CABINET

I cut the dressed stock for the carcase to size except for the slats and the drawer parts which were milled slightly oversized. The exact dimensions for the slats and drawer were figured out after the cabinet was put together. To cut the Domino joinery, I started mortising the sides first as the depth of cut was smallest (Photo 1). The same depth setting was used to cut mortises on the sides for the shelves (Photos 2 & 3). After changing the depth of cut, I cut the end grain mortises on the top, bottom and shelves.



PHOTOGRAPHS BY CHARLES MAK





To cut rebates for the back, I turned to my skew rebate plane. Through rebates were cut on the top and bottom pieces, and stopped rebates on the sides (Photos 4 & 5). To cut the stopped rebates, I chiselled out two notches at both ends on the side pieces before the rebate plane was used.

After sanding and dry-fitting, I proceeded with the glue-up using a liquid hide glue (Photo 6). To clean up the glue squeeze-out, I used a wet rag and a toothbrush.

## DECORATIVE SLAT BACK

A fancy-looking back is desirable for a display case, or when a dressier background will add a pleasing aesthetic effect, as in this bespoke cabinet. The beaded tongue and groove joinery will also take care of wood movement for the solid-wood back.

Using the size of the back opening, I figured out the rough dimension of the slats and trimmed the stock to size. I then examined the grain pattern, and worked out the placement of the slats (Photos 7 & 8).

To cut the beaded T&G slats, I followed the sequence of steps as below:

- 1 Cut the grooves with a plough plane
- 2 Use the groove to help set the tongue cutter, and cut the tongues with a combination plane (Photo 9)
- 3 Install the bead cutter and mill the beads on the tongue piece (Photo 10).

After all the profiles were cut, I dry-assembled the pieces, and trimmed the outer boards to fit (Photos 11 & 12). Finally, I predrilled holes for the slats, following an anti-racking screw placement scheme used by furniture maker Michael Pekovich (Photo 13)

## DRAWER CONSTRUCTION

The classic drawer features half-lap dovetails – the fine woodworker's calling card – and through dovetails. I have covered through dovetails in several of my previous projects, so my focus here is on the half-lap dovetail techniques.

First, I used the glued-up case to determine the dimensions of the drawer parts, with allowance for seasonal movement. I made the drawer slightly shorter than the case is deep so I could later fine-tune and bring the drawer to rest at the desired position: flush or inset. I marked the parts with the cabinetmaker's triangles before I started gauging lines.

## THE HALF-LAP DOVETAILS

In setting dovetails, I followed the practice of British-trained Ian Kirby, and set the first marking gauge about 0.5mm less than the thickness of the sides (see my previous article 'Cutting dovetails – proud, flush or shy' (*FE&C* 215) for details). I used the first gauge to scribe a line on the inside face of the drawer front (Photo 14). A second gauge was set at about  $\frac{3}{4}$  of the thickness of the front to lay out two lines. The first line was scribed on the end grain of the front to set the end wall, and the second line on the sides to determine the tail length (Photos 15 & 16). To complete the layout, I drew a vertical line from each end grain scribed line to aid sawing.

I cut the tails on the sides like any through dovetails. Then, I used a dovetail alignment board to mark the pins from the tails on the drawer front (Photo 17). Lastly, I cut the pins as follows:

- 1 Saw the pin diagonally on the end grain on the top (Photo 18)
- 2 Complete the cut by sawing on the face (Photo 19)

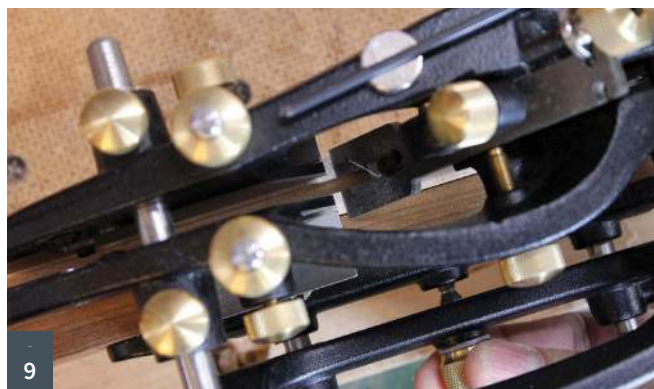


**3** Chop out the pin waste with vertical and horizontal cuts alternately (Photos 20 & 21)

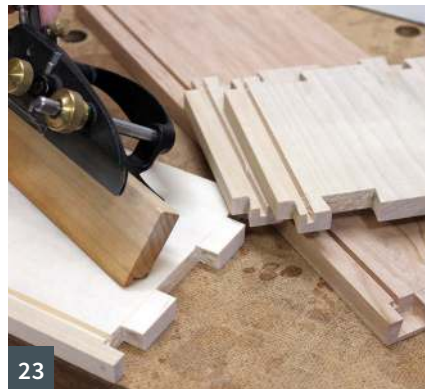
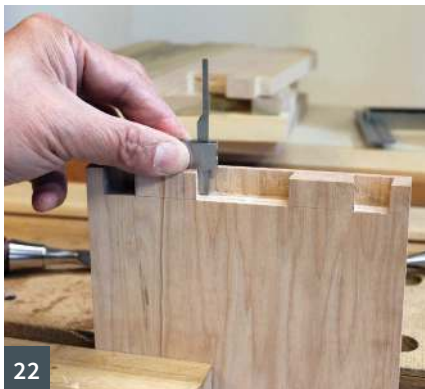
**4** Check the pins for square and dry-fit the joint (Photo 22)

## THE DRAWER PULL

With the half-blind dovetails done, I ploughed through grooves on all the parts for the bottom (Photo 23). In the last construction step, I marked out and cut the through dovetails for the back in the usual manner. Before assembly, I drilled out a stepped recess and installed the drawer pull, using the same handle design seen in my previous plane box (F&C 276). After the glue-up cured, I plugged the holes on the drawer, and planed everything flush (Photo 24)







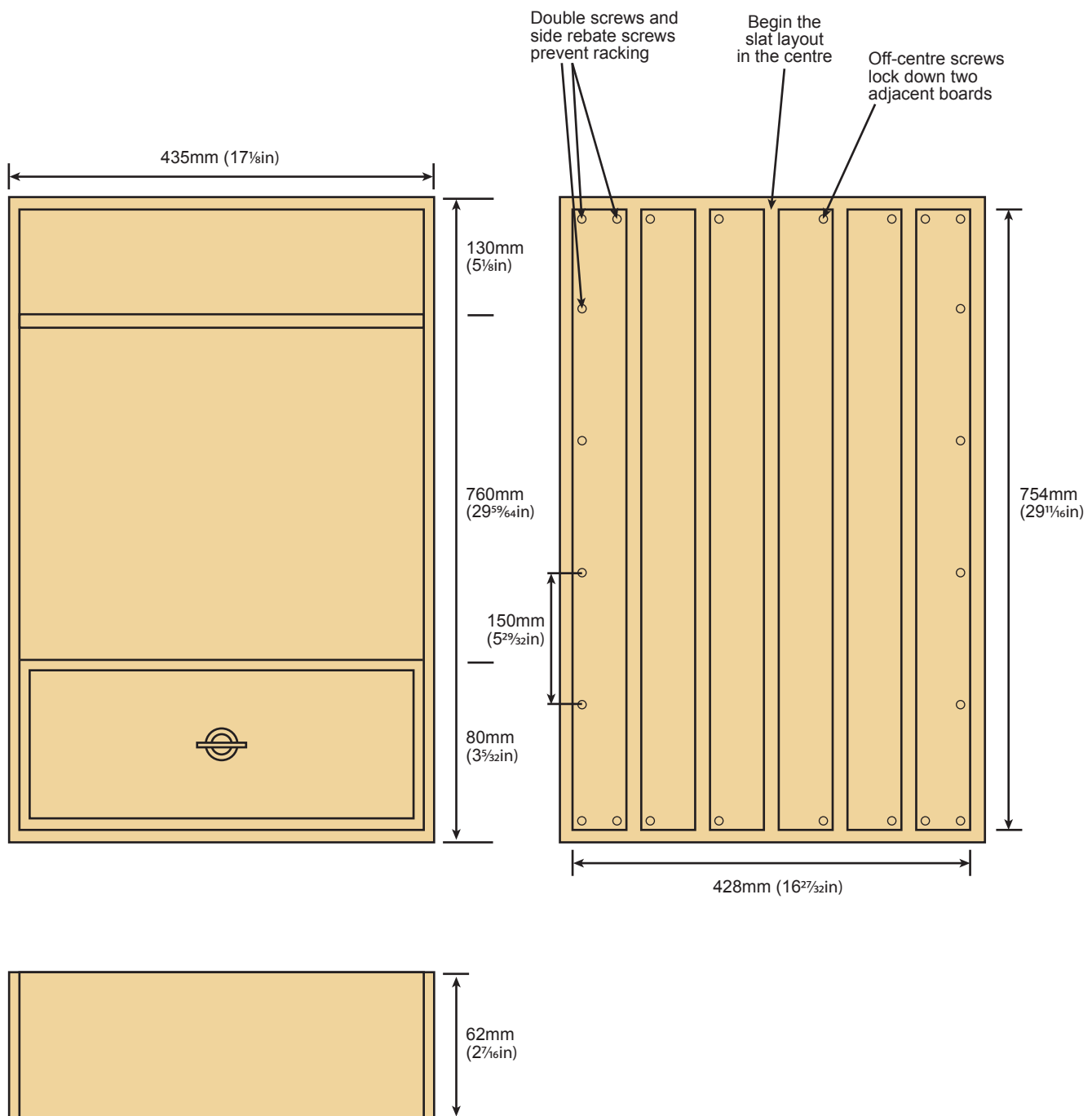
## FINISHING

Before the slats were installed, I applied three coats of varnish and a final coat of wax to everything except the case to avoid sticking. After assembly of the back, I mounted two screws to the back of the drawer, a clever trick that allows you to rest the drawer in any position – flush within the case or inset (Photo 25).

Aesthetic judgment, finely executed joinery, meticulous details and satin-smooth finishes are the hallmarks of works produced by such masters as Sam Maloof and Krenov. I adopted a similar formula to compose and deliver this bespoke cabinet, and I couldn't be happier with the final outcome.







*‘The understanding eye sees the maker’s fingerprints.  
They are evident in every detail... Leave fingerprints.’*

James Krenov 1920–2009



# Eat, drink and repair

Repair Cafés are growing in popularity – find out how your skills could be put to use

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Over the past 10 years, Repair Cafés have been springing up all over the world where people, of all ages and backgrounds, meet with the common aim of repairing things. Whether it's a malfunctioning blender or a wobbly chair; a faulty computer or a burnt-out hair-dryer; a rusty bicycle or a damaged ornament; you can take a broken item to your local Repair Café and, with the help of volunteer specialists, learn how to mend it.

Tools, materials and expertise are available at each location to enable you to make the required repairs and there is a strong community 'fix-not-throw' culture as people come together to share their skills and learn new ones – all while enjoying a comradely chat over a cup of tea.

## WHY REPAIR?

So much stuff is just discarded because it's damaged or not working. Most of it is incinerated, increasing dangerous emissions, or ends up in environmentally toxic landfill sites. The average household in the UK produces more than a tonne of waste every year. A National Statistics Report on waste management by local authorities in England for 2016/2017 revealed that about 4 million tonnes of waste was landfilled, about 10 million incinerated and more than 11 million was recycled or composted. According to the Waste and Resources Action Programme (WRAP), a charity that works with governments, businesses and communities to deliver practical solutions to improve resource efficiency, an estimated £140-million worth of clothing alone goes into landfill each year. And a good portion of the garments that go in the bin could often be repaired and re-used.

Going back 50 years or more, people tended to be more resourceful, learning skills to make and repair so their possessions lasted a lifetime. And white goods were designed to last – built-in obsolescence was in its infancy. Nowadays, many economies are driven by consumer spending. People are encouraged to chuck out what's broken or out-of-date in favour of something shiny and new, increasing manufacturers' and sellers' wealth while emptying the pockets of consumers. This replace-rather-than-repair-based economy has discouraged people from exploring their ability both to make and to mend items. Fortunately, though, change is afoot. Fuelled by environmental and economic concerns and the need to live resourcefully, more people are taking an interest in caring for and repairing possessions.

It's surprising what can be fixed with minimum effort, knowledge and assistance. And it will all help to reduce landfill and incineration waste, be more resourceful and energy efficient than sending materials for recycling, and lower the volume of raw materials and energy required to make new products. Do the mending yourself and you'll



save money, too. A fixing-and-making model also sends out a clear political message – that society can no longer afford throwaway habits.

Learning how to make something almost as good as new (and sometimes even better) also brings a great deal of personal satisfaction and a sense of achievement. Practical skills can also make a real difference to the community.

## HOW REPAIR CAFÉ STARTED

The impetus for the Repair Café movement came from a passionate sustainability journalist, Martine Postma. Shocked by the amount of waste in society, she organised the first Repair Café in Amsterdam in October 2009. It was a success and, two years later, Martine went on to form the Repair Café Foundation. This non-profit organisation, based in the Netherlands, provides professional support to communities across the globe who wish to start and run their own Repair Café. At the moment, there are more than 1,500 Repair Cafés worldwide, each striving to make the art of repairing things an intrinsic part of their community. With the help of repair experts, their aims





are to maintain and promote the fix-not-throw ethos and to bring together people from all walks of life to encourage a greater push for environmental sustainability.

The Repair Café celebrates people's practical and specialist skills and encourages them to share their expertise. The Foundation points out that it isn't competing with professional repair businesses. Rather, it encourages independent businesses to get involved, believing this will encourage more people to use their services and take the repair-rather-than-chuck option. The Repair Café isn't somewhere you go to have an expert do an inexpensive repair on your toaster, for instance. It's a place where you're taught the skills to do your own repairs. It's a collaborative initiative. Many who visit often stay on to learn more skills and go on to help others to repair whatever's brought through the door – kettles, vacuum cleaners and record players to name a few.

At the same time, Repair Café encourages people to appreciate the value of what they have and to adopt a mindset for a sustainable society. They show people that learning to fix items can be interesting, creative and fun.

## GET INVOLVED

If you have repair expertise – such as crafting, mechanics, engineering, electrical or computer skills – perhaps you could share your skills with others. It could be you're passionate about living more sustainably or are just interested in learning to fix everyday items. If so, you can arrange to visit your local Repair Café. You can find your nearest branch at [repaircafe.org/en/visit/](http://repaircafe.org/en/visit/).

Repair Cafés tend to meet monthly at a venue where everyone has the chance to have tea, coffee and a bite to eat in a relaxed setting. The environment is kind, supportive and engaging with everyone enjoying the challenge of bringing broken items back to life. Working together with people in your local community brings friendships, too, and helping to repair something can be amazingly fulfilling in unexpected ways.

## SET UP YOUR OWN REPAIR WORKSHOP

- Post a notice locally for repair volunteers. It's important to say they need to be dependable, enthusiastic and willing to give their time to repair things.
- Look for a suitable meeting venue where you can carry out repair workshops and securely store any tools, materials and items for repair. Make sure it's a safe, welcoming and social environment.
- Ask for donations of repair tools and materials on Freecycle or Gumtree.
- Set up in a small-scale way first. Give consideration to how you will organise your space and time.

The Repair Café Foundation has created a useful kit that can help get you started. Find more details at: [repaircafe.org](http://repaircafe.org)

Words: **Carol Anne Strange**



# Turned stool

Rick Rich turns a  
four-legged stool  
using a mini-lathe

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Mini and midi-lathes seem to be ever more popular these days. Lower price, not much space needed and easy to move from bench to shelf were reasons I purchased one. Like many woodturners, I now have a full-size lathe and a mini-lathe.

Small and delicate creations often dominate the turnings made on mini-lathes, so this project will use the small lathe at complete capacity. This stool was designed to be turned on a mini-lathe with only 300mm of swing and at least 355mm between centres once the drive and revolving centres are placed. My mini-lathe just allows this. Of course you can make a larger version on a bigger lathe if you choose, just scale up all the measurements.

For this small stool, I turned a Windsor-style design to convey a classical look. To get the leg design to look correct I had turned several legs moving the 'working parts', which are the bead, cove and balusters up and down until I liked what I saw. I then made the story stick I use from that leg.

For this design, the tenon is marked 38mm from the top of the blank and turned 20mm round. The tenon base must then swell larger at the same place on all four legs. This provides a base for the tenon to stop against the bottom of the seat blank.

No special tools are required for this, the few woodworking tools and supplies needed are likely already in your toolbox or easily obtainable from a hardware or building supply store. I use a standard school supply-type protractor and pencil compass.

To make it easier to set the legs into the seat, make a simple jig of 20mm plywood 300mm square with the corners cut out. The jig's purpose is to support the seat and raise it so the leg tenons can protrude through. The other jig is simply two small pieces of construction 40 x 100mm timber, with a V-notch cut into each. It supports the leg when cutting the saw kerf.



## YOU WILL NEED

- PPE & RPE
- Drive and revolving centres
- Four-jaw chuck with standard jaws and woodworm screw
- Spindle roughing gouge
- Skew chisel
- Spindle gouge
- Parting tool
- Bowl gouge
- Chatter tool (optional)
- Sliding bevel, pencil compass and protractor
- Two turning 'outside' callipers
- Two clamps
- Drill with proper bit for screw centre

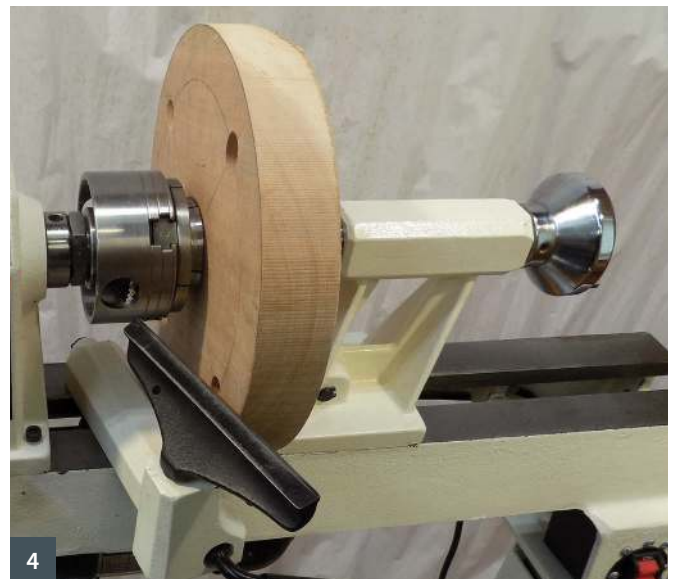
and a 20mm spade bit

- Hand saw
- Hammer
- Seat jig – 300mm square 20mm thick plywood with corners cut out, and two V-jigs

### Blank sizes prior to turning are:

- One seat blank – 250mm round x 38mm thick
- Four leg blanks – 305mm long x 38mm thick
- One button blank – 75mm long x 38mm thick
- Four wedges – about 50mm long x 20mm wide with one end tapered. I used hard maple





## SEAT LAYOUT

- 1 Place the seat blank on your workbench with the centre mark side up. This will be the bottom side of the seat blank. Use the protractor ruler to measure and spread the pencil compass – pencil to point to 95mm. Use this to draw a 190mm diameter circle around the centre mark. Find the grain line along the blank the best you can. Align the protractor with the grain line and make a mark at 45° from centre. With a straight-edge (the story stick will suffice), mark a line at 45° from the grain line. Go from edge to edge. Pick either side where the line intersects with the circle. Place the pointy end of the compass there. Stretch the compass out enough so the pencil will mark a short line above and below the halfway point along either side of the middle. Do this from the other intersection also. There should now be an X on the side of the circle. From this X and the centre mark, draw a line from edge to edge. There should now be four equal intersections around the circle. These are the leg hole drilling points and layout lines.

## SEAT DRILLING

- 2 Load a drill with a 20mm spade bit. Mark or centre-punch

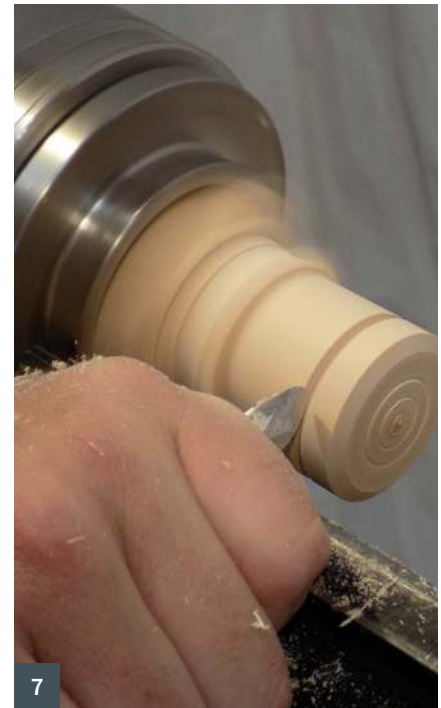
the four leg intersections. Set the sliding bevel to 75°. Clamp the seat blank, layout side up, to the workbench. Leave about half the blank overhanging the workbench edge. Place the sliding bevel alongside the layout line, leaving room for the drilling to take place. Drill through the blank using the sliding bevel to guide the drilling angle. The angle will be towards the centre of the blank so the legs splay outwards. Use the layout line to keep the hole straight while drilling the angle. Be careful to ease the drill bit and don't apply too much pressure as the bottom of the hole can suddenly give way. In addition to being dangerous, it can cause more tear out than if moderate pressure is applied. I don't worry too much about the tear-out because the blank is still thicker than needed. Drill the remaining three holes this way.

- 3 Drill a hole in the centre of the blank bottom 20mm deep or the proper size for your chuck screw centre.

## TURNING THE SEAT

- 4 Mount the blank on to the chuck screw centre. Advance the tailstock revolving centre for extra security. Screw centres longer than 20mm from the jaws will need a spacer in front of the blank.



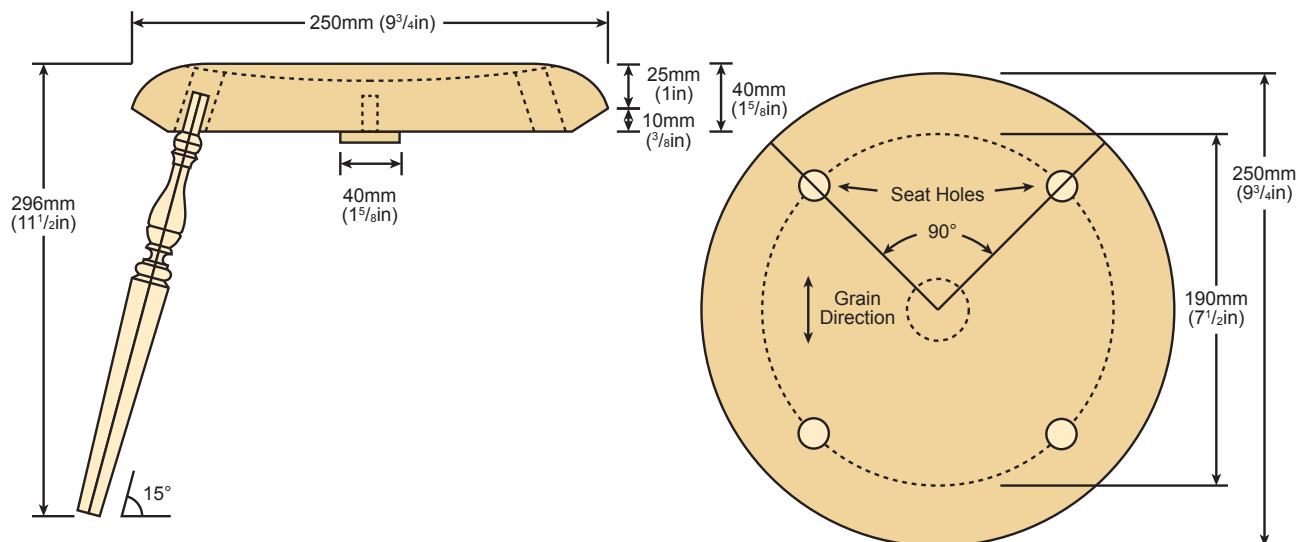


- 5 Mark the blank sides at 10mm and 35mm from the blank bottom side (headstock end). Set the toolrest for cutting the bottom side of the blank. Turn the lathe on – the layout circle and the marks on the blank sides should be visible. If the marks are not visible, make them darker or longer. With a bowl gouge, connect the layout circle line on the blank bottom with the first line 10mm from the bottom edge. Take small nibbles instead of trying for one cut. Once complete, turn the lathe off and reset the toolrest to cut the other side of the blank. With the bowl gouge, remove excess material from the blank top down to the second line made 35mm from the bottom edge. Round over the top edge to make a pleasing radius for the seat top, connecting with the bottom edge made earlier.
- 6 Remove the tailstock support. Dish the centre of the seat like a very shallow bowl, being careful not to go more than about

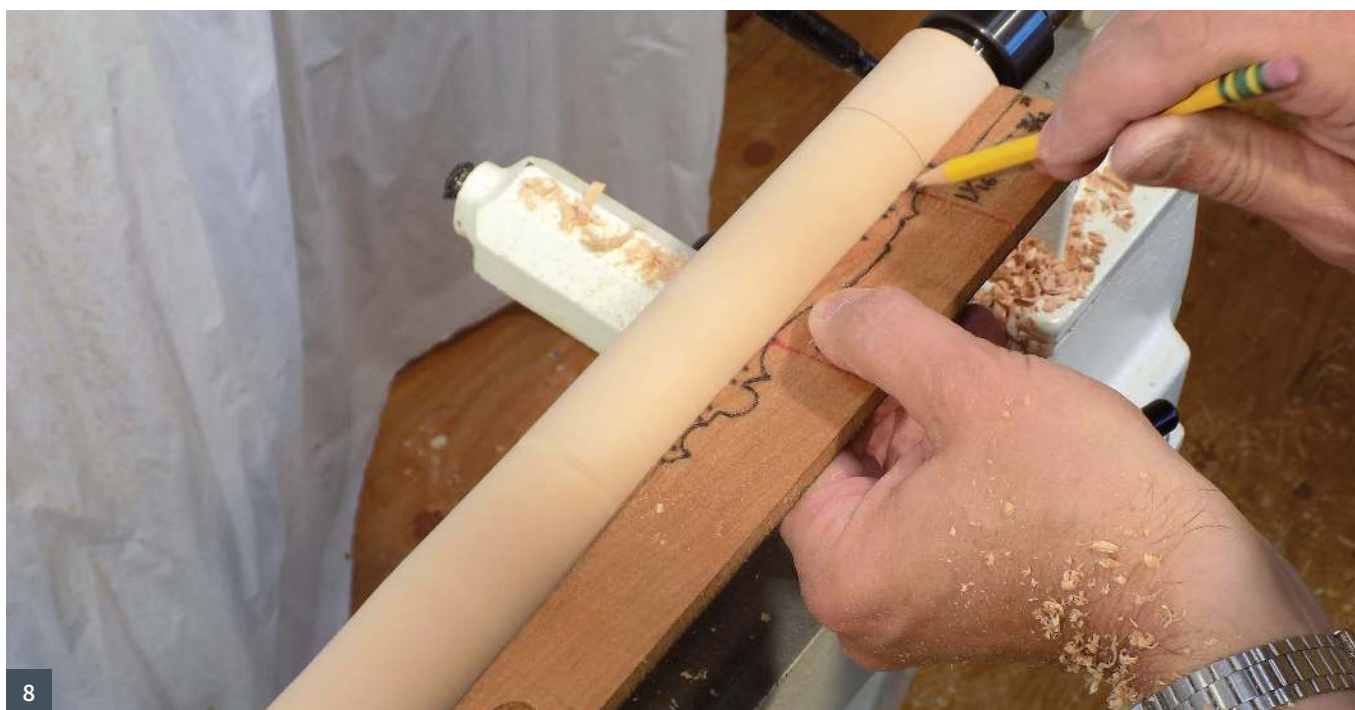
6mm deep. Once complete, sand, finish and remove from the chuck.

## BUTTON TURNING

- 7 Clamp the button blank securely in the chuck jaws and turn the exposed portion of the blank round and smooth, being careful of the jaws. Use your skew to peel cut if desired. Smooth the sides about 25mm from the edge. Smooth the end face or cut small grooves in the end as I did. Cut a V-groove about 10mm from the face end and part down to 8mm (or bit size used to drill centre hole) to make a tenon about 13mm long. Parting slightly inwards towards the button face allows the edges of the button to seat completely around. Part the button off.

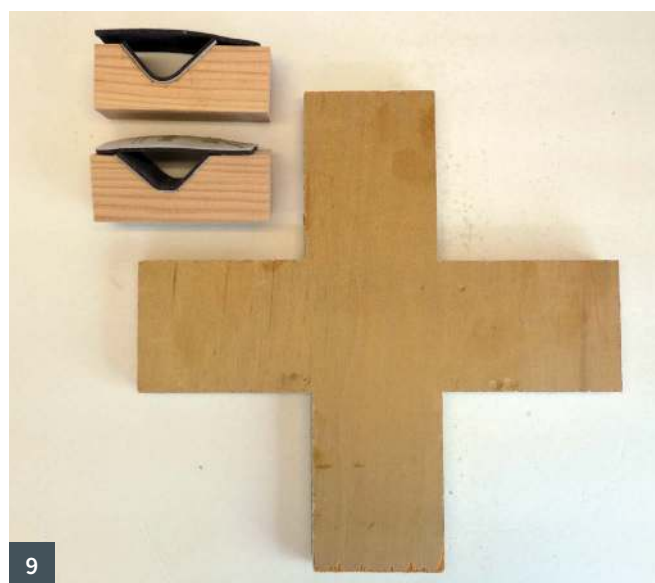






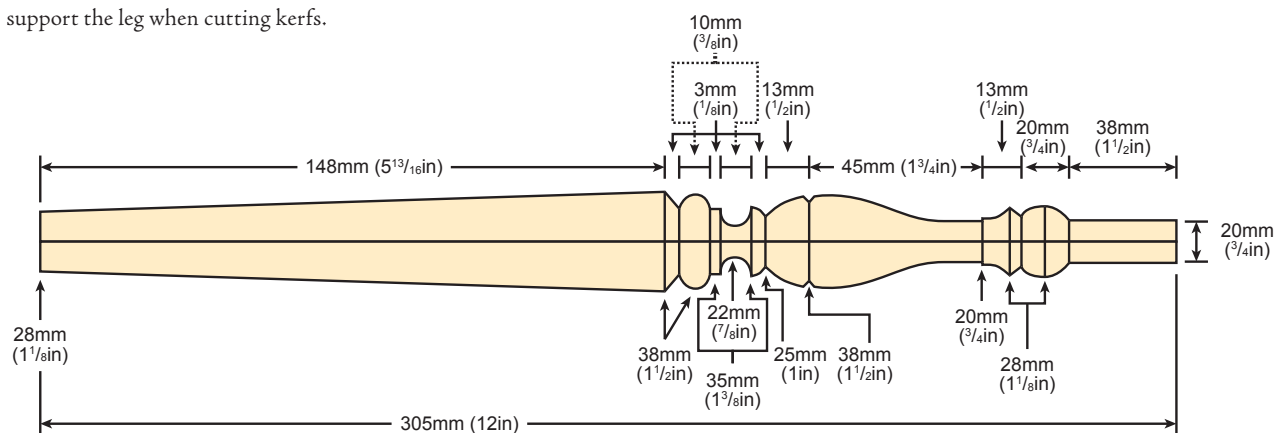
## LEG TURNING

**8** Mark and punch centres on all four leg blanks and mount between centres. Set the toolstock to turn the tailstock end first, which will be the top tenon portion of the leg. Set the callipers, one to 20mm and the other to 26.5mm. Turn the blank round. Using the story stick, mark the tenon and other leg details. Turn the leg to the desired design. Check the tenon fit in a seat leg hole. It should go in relatively easy yet fit snug. Like other woodworking mortise and tenon fits, try the gravity test. Install the leg tenon into a mortise. Lift the leg up. The seat should stay with the leg, at least briefly. If you must beat the leg in with a hammer, it is too tight.



## WEDGE KERF SAWING

**9** Now make a simple jig board and leg holder. The jig's purpose is to support the seat and raise it so the leg tenons can protrude through. Take a piece of 19mm plywood, 300mm square with the corners cut out. The leg jig comprises two small pieces of construction timber 50 x 100mm with a V-notch cut into each to support the leg when cutting kerfs.







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11

- 10** Install (dry, no glue) all four legs into the mortises of the seat. Arrange the tangential plane of each leg to the grain line of the seat. Mark the leg at the tenon base to the layout line. Number each leg and hole respectively – 1:1, 2:2, etc. – to help place the proper leg into the proper mortise on glue assembly. With the legs attached, turn the stool over on to the legs. Mark the top of the tenons at a 90° angle to the grain line of the seat.
- 11** Remove the legs and draw a line down the tenon on all the legs from the line marked on the top, stopping about 10mm up from the tenon base mark you made. Secure the legs in the leg jigs and saw the line drawn down the tenon to make a wedge kerf on all four legs.

## STOOL ASSEMBLY AND LEVELLING

- 12** Place some kitchen paper on the bench and put the board jig on the paper. Place the seat, layout side up, on the board. Glue the button in place and spread glue in each mortise. Start with leg one and glue the tenon into the corresponding mortise, making sure the alignment marks meet. Repeat for the remaining legs. Now turn the stool right-side up. Glue the wedges and hammer them securely into the sawn kerfs. Clean up any glue squeeze-out and allow to dry. Place strips of masking tape on the seat top and



12

use a flush-cut saw to cut off exposed tops of tenons and wedges. Remove the tape and sand the seat as necessary. Apply finish as desired and set the stool on a flat surface. Find out which legs need trimming and use one of the following methods to trim any legs. Method 1: Use a block plane to remove wood from the bottom of the longer leg(s) until the stool sits flat. A bench vice is handy to hold the plane while rubbing the leg bottom across the plane. Method 2: Sandpaper is taped on the bench and the longer leg bottom rubbed across it.

## Top tips

- 1 For the drive spur, I use a Steb-centre, which seems to slip easier than a standard four-spur centre if a cut gets too heavy.
- 2 Use a ice lolly stick or old toothbrush for glue spreading – cheap and disposable.
- 3 Put masking tape on the seat prior to cutting the tenons. It helps save the seat from being scratched by the saw blade.
- 4 Use a flush-cut saw to cut the tenons off for best results.
- 5 Set the toolrest at centreline, or slightly above as I prefer, for use of the skew chisel.



# Tea, anyone?

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

If you're a tea lover you may be pleased to learn that sitting down with a cup of tea (and maybe a biscuit or two) is one way to reduce stress. A 2015 meta-analysis of 11 studies with almost 23,000 participants found that for every three cups of tea consumed per day, the relative risk of depression decreased by 37%. This association may be linked as much to the way the tea is consumed – the fact it often involves taking a break – as it is to the drink itself. For many people, tea indicates a time to stop and pause, to step away from stresses and anxieties.

Tea does a big job. It quenches thirst, warms the body and nourishes the mind. It's a way to connect with others as well as oneself. Now, where's the kettle?

Try out these stress-busting puzzles on your next tea-break!



WORDS BY FRANCISCA BAKER/PHOTOGRAPHS COURTESY OF SHUTTERSTOCK

## WORDSEARCH

|                |               |                   |
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| <b>Bench</b>   | <b>Dowel</b>  | <b>Polish</b>     |
| <b>Cabinet</b> | <b>Hammer</b> | <b>Saw</b>        |
| <b>Carve</b>   | <b>Joint</b>  | <b>Tools</b>      |
| <b>Chisel</b>  | <b>Nail</b>   | <b>Turner</b>     |
| <b>Crafts</b>  | <b>Oak</b>    | <b>Woodworker</b> |

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

## 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.**

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





# Decorative laminates

Daniele Nocetti learns more about these useful products

It's a functional, everyday material that is ubiquitous in many homes, but laminate has a hidden history and harbours some secrets in its dense layers. Decorative laminate was originally used during the first decades of the 20th century. In its raw version, created by the Formica Corporation in the United States, decorative laminate was mainly intended to replace the mica in electrical appliances, mica being a flaky mineral used in the past as an electrical or thermal insulator inside electrical appliances.

This use gave rise to the title of the substance, which was called 'for mica', hence the name of the company which started producing it, around the end of the 1920s. When the laminate was still raw and obtained by pressing kraft paper together, a decorative paper was applied, which could be used as external finish for home décor items.

As the paper was soaked in melamine resin, the material obtained was hard, resistant to scratches and could be cleaned with any commercial detergent, making it a hygienic product ideal for finishing tables, workbenches, hospital furniture, kitchen and bathroom units and so on.

Mass production began in the US before World War II and in the 1950s it was imported into Europe with the brand name Formica, which has sold this innovative product in large quantities.



PHOTOGRAPH COURTESY OF ALBERT LAMINATI S.P.A.

Decorative laminate used for a modern modular kitchen. The product's popularity is due to the sturdiness and easy maintenance of worktops

Later, when other companies started making the same material with their own trademark, end users were still calling all decorative laminates Formica – the trademark of the first producer had become the generic name of the product.





PHOTOGRAPH BY SHUTTERSTOCK

## MANUFACTURING LAMINATE

So how is a decorative laminate made? A substrate made of kraft paper is impregnated with phenolic resin, which is thermoset. Every sheet is pressed between cylinders to remove excess resin, then it's dried and hardens in the next furnace. The sheets, dried and cut, are stored in a warehouse until they are assembled to build the required thickness. On top of this dark brown support a decorative paper is applied, which is the finish of the decorative laminate. The paper could be plain or could have patterns or

a picture of a panel coated with genuine veneer or natural stones.

The decorative paper is soaked with melamine resin (thermoset resin). A number of sets of sheets are then prepared to be assembled together inside the multi-opening press (with multiple levels, each level for one set of sheets), which works at approximately 90 bar pressure, heating the layers up to 150°C and hardening the phenolic and melaminic resins to obtain a resistant, dense and adequately flexible material.



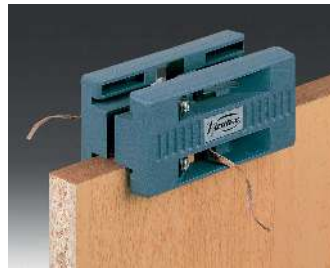
This picture shows the first processing phase: the kraft paper roll turns and the paper goes into the area where it is impregnated with phenolic resin and heated in the furnace



In the background can be seen the multi-opening presses open, where the sets of sheets are placed to be pressed to become a decorative laminate



## HAND TRIMMING AND EDGEBANDING



For bonding the small pieces (e.g. the edgings) the best results come when the laminate has contact with adhesive. If you don't have the proper tools (as in electric cutter, router or other automated edgeband equipment) it is possible to buy accessories, such as adjustable cutters with which you can cut strips of different widths from a laminate sheet. To trim you can use jigs, which allow you to cut at 90° and 45° and to trim two edges at once. Their blades are made of hard material and need replacing as soon as there are some chippings on the exposed face of the cutter.

If you happen to be where there is no proper equipment and you need to bond a laminate sheet, you can resolve the issue using a

Stanley knife, cutting with the help of a ruler several times over the decorative side until the sheet is engraved; subsequently the sheet can be snapped.

The most common thickness is 0.7 x 0.9 x 1.2mm sheets. There is a smaller thickness which varies from 0.4-0.5mm, and it's usually arranged in rolls as it's quite flexible. It is used to finish accessories paired with other laminate panels, for example, on kitchen worktops the strips to cover the gap between the top and the wall. This product is called continuous high pressure laminate (CHPL) and is obtained by pressure with the roll bending press, not on a multi-opening press.



With a ruler or guide a section of the sheet can be engraved, then snapped even without having the proper equipment. A lot of attention is needed because, if the cut is not clean, the frayed edges can be as sharp as razor blades



The variety of laminate is endless. These pictures show samples with different shades of plain colours

## PREFORMED LAMINATE SHAPES

There are laminates with thicknesses from 0.6-0.9mm, which can be curved very tightly (5-6mm) if warmed properly; these are called 'postforming'. These sheets are used to finish chipboards, trimmed on the rounded front edge, used to make kitchen worktops or the bars for postformed doors, with longitudinal round edges, or other curved objects. The temperatures to which the sheets are exposed vary according to the curvature and the thickness of the laminate; usually they are between 150°– 220°C.

The panels finished with laminate (on both sides, as with veneering) need to be edged to have a good quality finish, as they hide the support panel.

The edge can be made in ABS or PVC; both have the required flexibility and the colour along the whole thickness, but the right colour has to be chosen to match the laminate or contrast with it. An alternative solution could be to use the laminate strips used for the main surface, thus having the perfect match of colour and finish. In this case





there is a downside on the cosmetic effect as the laminate edge is applied perpendicularly to the top surface of the panel. Once it is trimmed, it will show the phenolic support (dark brown), which constitutes 90% of the laminate thickness.

At this stage, if the laminate used for the surfaces is dark-coloured, the edge of the

phenolic support will be less noticeable; however, if it is light-coloured, then on the edging the brown line of the resin will be clearly visible. To address this issue, new types of laminates without phenolic resin have been created. They are manufactured with a thermoset coloured melaminic resin with the same shade as the decorative paper;

this represents the ideal complement for edging. It needs to be taken into account that this material is more rigid, so more fragile, than traditional laminate, and tends to chip during cutting. This means that during the edging, sharp carbide tooling needs to be used, otherwise it can cause irreparable damages.



The laminate usually needs to be edged. The edging can be of different thicknesses and type. It can be metal for the most wearable surfaces or plastic and impact-resistant surfaces. Or with stripes of the same colour and pattern of the laminate, notwithstanding the design values, to offer different and neater solutions



On the edge of this top can be seen the effect of the edging of a kitchen worktop with the same laminate. The dark edging of the phenolic support is noticeable in spite of being well disguised by the colour of the surface. If it is not necessary to use more expensive materials, which are solid, and it is better to avoid light colours for this type of product

## SPECIAL FINISHES

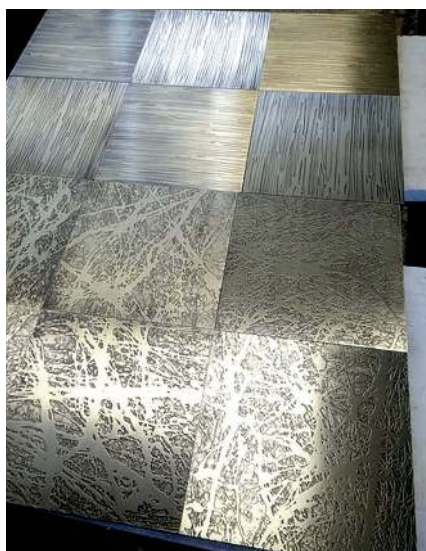
There are other types of standard laminate, which are more sophisticated with special finishing. There is also, as an example, a 'magnetic' laminate which is not magnetised but can be used as magnetic board, for educational purposes. It is manufactured as whiteboard/blackboard.

Another type of special laminate is that with the decorative paper being a metal sheet, which can be matt, glossy-mirror, satin or with a different texture partially polished; all these types of sheets come with a protective film that can be removed after being fitted.

This laminate can be used in place of sheet metal to cover wooden surfaces or similar, provided the edges are hidden, otherwise the trick can be easily spotted.

The thickness of the aluminium sheet (lacquered or anodised) might vary from 0.15-0.5mm, so the tooling must not get damaged. The metallic surface can be textured to give a three-dimensional effect.

Texturing can also be applied to traditional laminate sheets to give a particular appearance, such as a leather or rough wood. The laminate sheets can be bonded to various wooden supports with different products – vinyl, aliphatic or ureic glues can be used and they require a press to provide a proper



The application of thin metal sheets allows for different solutions, ranging from ease of maintenance to decorative effects

application. The panels and laminates can also be covered with neoprene-based adhesives spread with notched trowels (there are also systems for spray guns for large surfaces) and the two sides pressed together as soon as the solvent evaporates.

There are also laminates that have a real wood veneer or 'reconstituted' veneer; these sheets look more realistic than printed



images of wood. They can be used in place of standard veneer, with the advantage that you don't have to worry about the final varnish as they come ready made by the manufacturer.

It is advised to put a cornice on them or use them as wall panelling (with adequate support), with cover gaskets between two panels.



## FLOORING



Many years ago, the production of the elements for floorboards started with the plastic laminate surface. The square tiles for the floating floors are thicker and more rigid

Another type of laminate of amazing effect is the one featuring false natural stones, which can have a gloss or matt finish, making an impressive impact from a lifelike point of view. This has been made possible thanks to the evolution of digital photography. Among other things, with this method it is possible to create bespoke laminate sheets, with a drawing or a high-definition picture chosen by the customer.

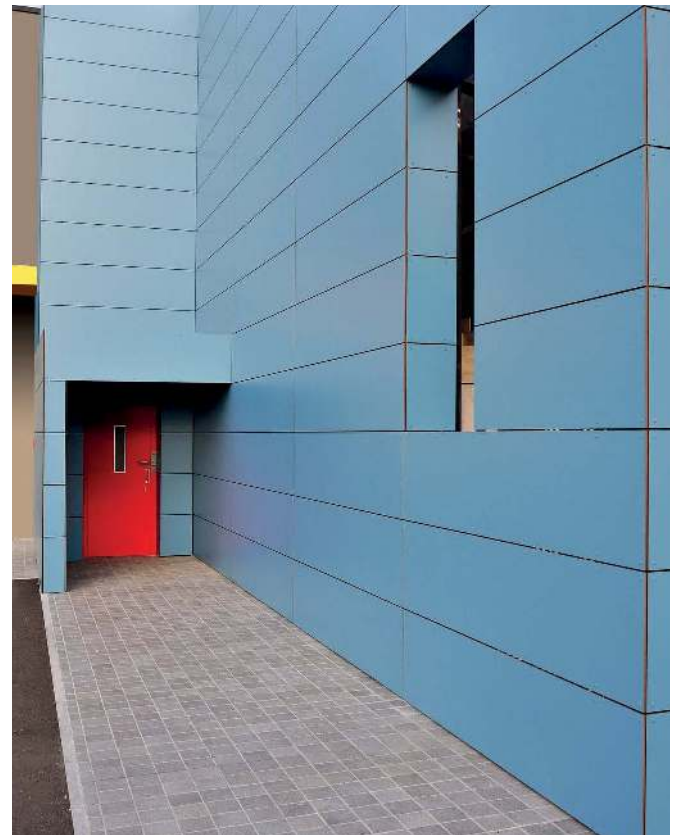
There are also laminates that can be bonded to suitable support panels to make square tiles or floorboards for floating floors or to cover an existing floor, to give a new look to a room.

In these cases, the laminates have different features to be more resistant to wear by foot traffic. In fact, instead of soaking the last layer with the usual melaminic resin, they are soaked with a fine, transparent coating of corundum powder, which is highly resistant to wear.

Recent times have seen the development of laminates called 'anti fingerprint': if you touch a panel finished with a dark-coloured matt laminate, you leave quite noticeable fingerprints because of the skin's oil, which stands out as stains on the surface. To solve this annoying issue, a special type of laminate has been produced with a superficial texture that allows a micro-rough diffuse reflection, which means the stains cannot be seen with a naked eye.



The structural multi-layered laminate doesn't need to be bonded to a support panel because it's self-supporting. It's used to manufacture furnishing subject to considerable and regular stress, even in high humidity environments



Some types of multi-layered, UV-radiation resistant, are used for so-called rainscreens used as cladding for buildings



## MULTI-LAYERED LAMINATES

In another laminate with phenolic support, there are sheets of considerable thickness (from 2-30mm) which do not need to be bonded to a support panel as they are so rigid and resistant they can be considered self-supporting. Because of this, they are finished on both sides with the decorative paper soaked with melaminic resin, contrary to the other standard laminates.

These panels are usually called 'multi-layered' and the manufacturing process is similar to standard laminate, with the difference being that there are more layers of kraft paper and they remain in the press longer, to make sure the middle layers can properly harden. Of these multi-layered panels, one type is weather-resistant and used as cladding for buildings to obtain 'rainscreens'; they can also be used to make road signs.

Another use for this product is cabinet doors, for example in locker rooms or swimming pools where the environment is humid and chlorinated, or to make walls for sanitary facilities, where sometimes it is necessary to use aggressive detergents.

These panels can also be bent and it is necessary to distinguish

the two options: if the panels need to be slightly bent, they must stay within a limited thickness and can be bent on site to fix them to the main structure. If the curvature needs to be greater, it is possible to hot-form postforming laminates in the factory.



The bending can be performed during or after (postforming) the last press. In both cases the material needs to be heated



An example of a curved rainscreen with multi-layered panels

## NATURAL STONE FACING

A material similar to these laminates is a product made of a resinated fibreglass support, to which is applied a thin sheet of natural stone, available in different colours and with different textures. These sheets are not suitable for worktops, only for vertical finishing and especially for wall-mounted panels, to recreate the effect given by natural stones. The sheets are very thin, usually between 1-3mm depending on their type, and they can be cut with a chop saw.

To bond these types of sheets a standard press can be used, however a polyurethane foam needs to be placed in between to distribute the pressure evenly on the bumps and hollows without crumbling the surface.

## POLYMER SHEET

Let's close with a product that has been on the market for a few years but is still not widely known to consumers – and we assume it will be popular as a furniture door covering. It is very similar to laminate, is called 'polymeric sheet' and doesn't require edging as it's very deformable.

Starting with an MDF panel as the inner side, already covered with a plastic sheet – usually polystyrene or PVC – the edges of the outer side of the panel, which is impregnated with glue, are rounded. On this panel is placed a PVC or PET coloured sheet, the same colour as the inside face but a bigger size. At this stage everything is placed in a vacuum heat press. The polymeric thermoset sheet is deformed by the vacuum inside the press and adheres to the MDF panel, also turning



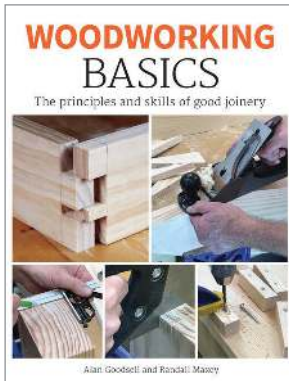
This is the effect of a panel with finishing in sheet stone that, due to being made of flakes of different thickness, cannot be used for worktops

over the edges. Once the panel is out of the press, excess material is removed from the inner side and the door is covered. This type of material, however, is not as resistant as the laminate sheet, so it cannot be used for a worktop or a kitchen top, neither does it offer protection from scratches.

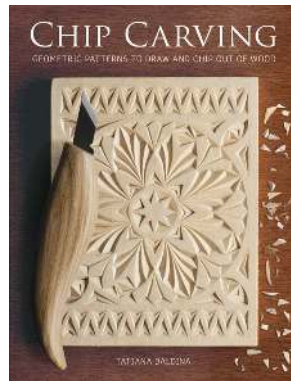
We thank Dr Federica Ferraris and Luciano Manegaldo of Abet Laminati S.p.A., for their cooperation in drafting this article.



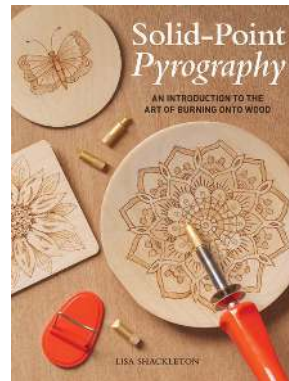
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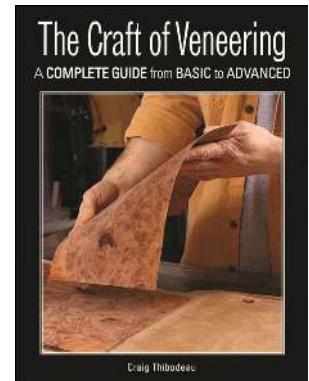
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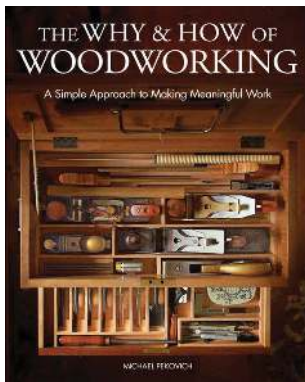
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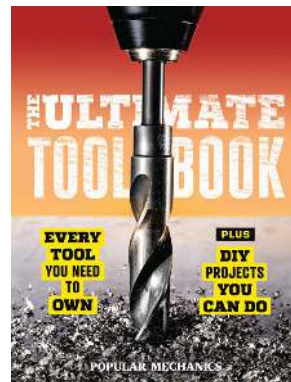
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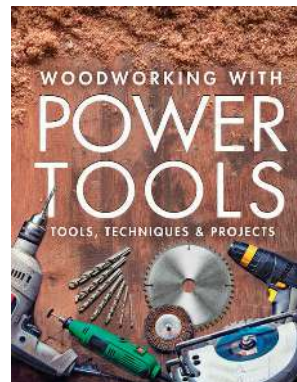
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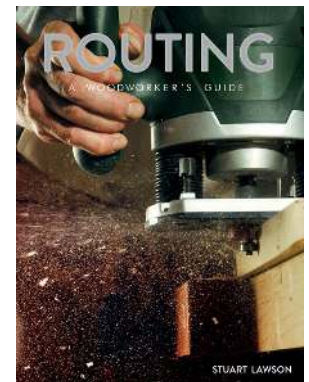
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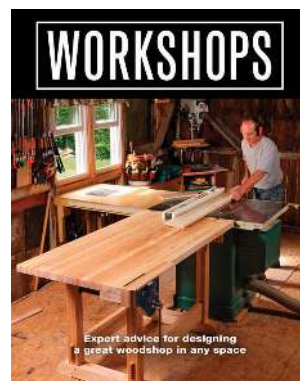
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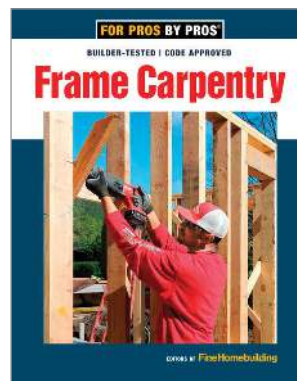
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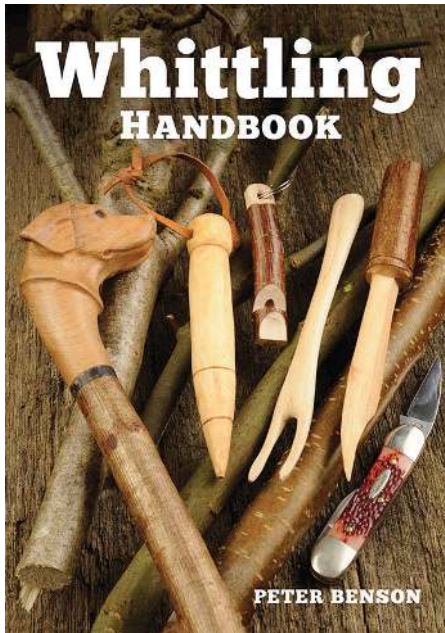
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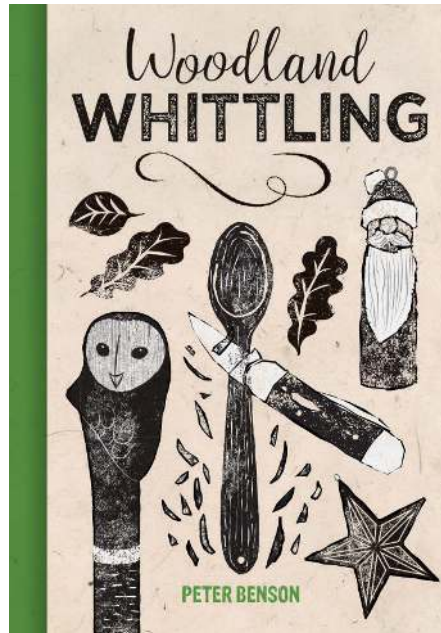
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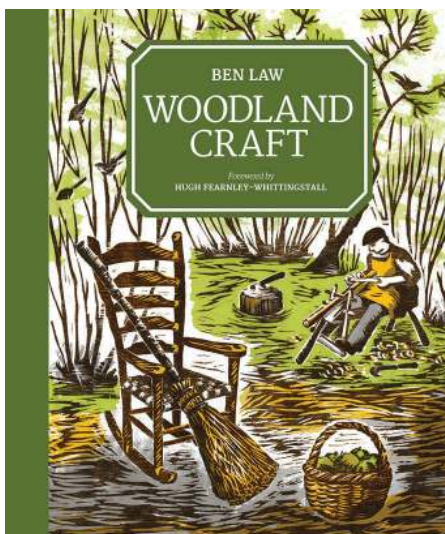
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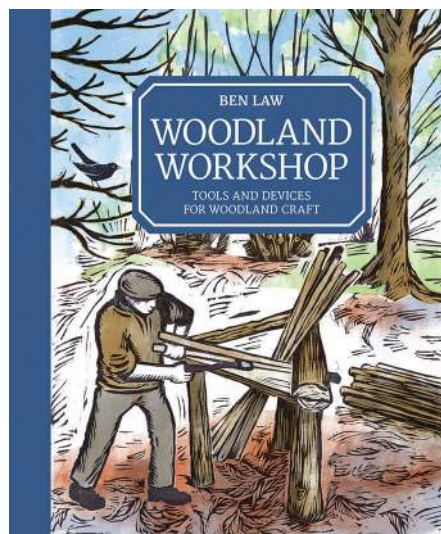
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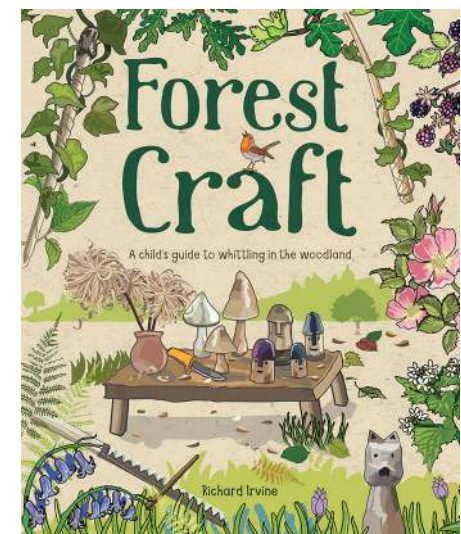
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POSTAL CHARGES APPLY



# A mid-century style folding step stool

Michael T Collins takes a step up

There are hundreds of designs featuring stools that transform into step stools. Some are called library stools and others kitchen stools. But I have never seen a design quite like the one that our family has used for the last three decades. Over the years my children have used it as a highchair, side table, step stool, stool and part of an imaginary shop till.

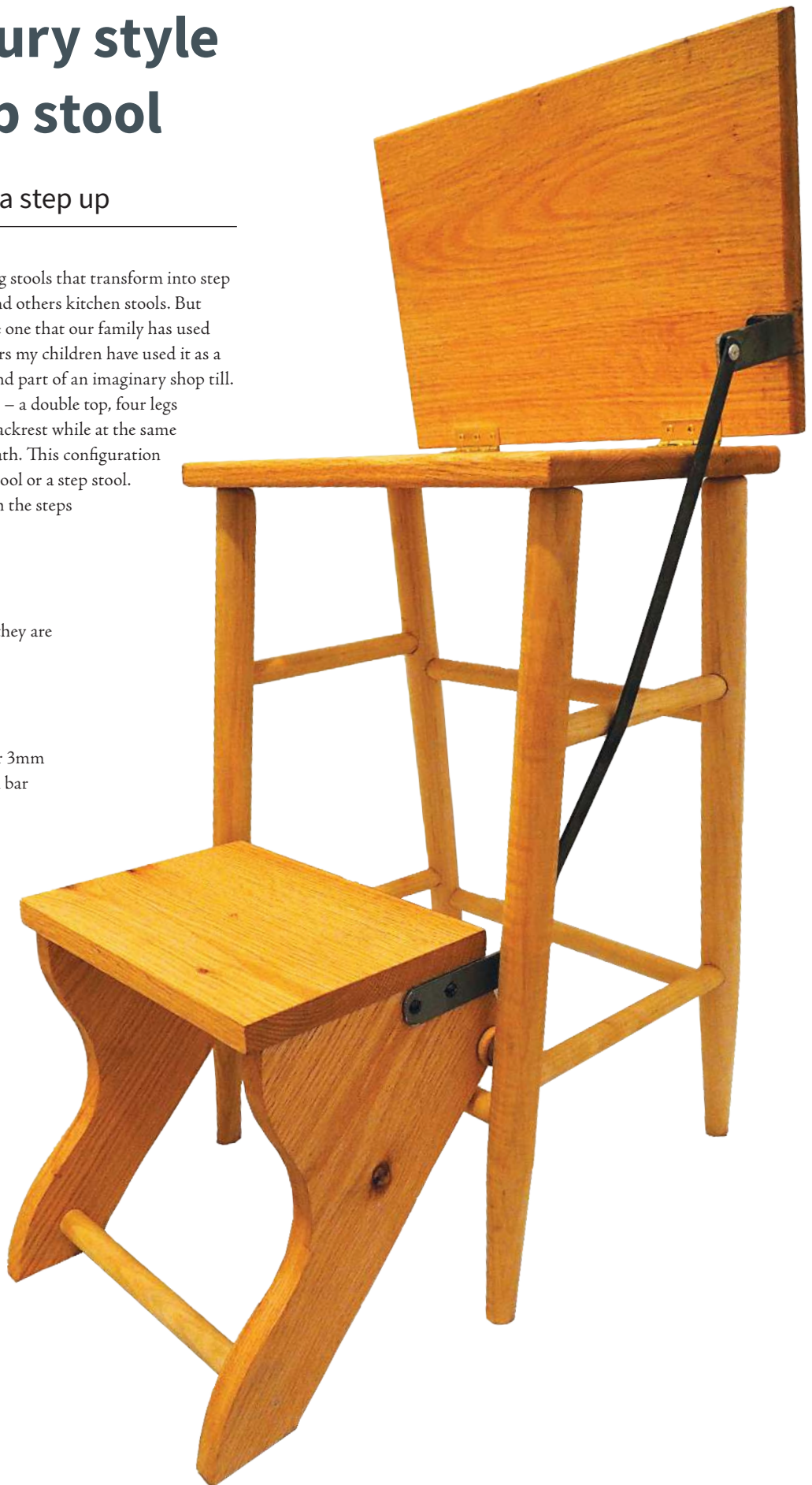
It's a very simple mid-century design – a double top, four legs and when the top is lifted it creates a backrest while at the same time lowers a small step from underneath. This configuration makes this an ideal child's highchair, stool or a step stool.

In this article I will take you through the steps (no pun intended) to make this stool.

## YOU WILL NEED

- Legs – 4 x 35mm dowels, make sure they are longer than you need
- Rails – 1,000mm of 20mm dowel
- Fixed top – 355mm x 250mm
- Back top – 364mm x 265mm
- Close/open lever – 1 piece of steel bar 3mm x 10mm x 475mm and 1 piece of steel bar 3mm x 25mm x 250mm
- Step pivot – steel rod 310mm x 6mm

I chose to make the four legs using some hard maple that was just the right thickness. Alternatively, you could laminate boards to obtain the desired diameter. Failing both these options, there are many online stores that sell dowels in varying diameters.







1



2



3



4



5



6

- 1 The wood was first ripped to a tad larger than the required dimension and then the edges ripped to form an octagon. With less wood to remove, turning them is a little easier and faster. Proceed to turn the legs on a lathe. If you do not have access to a lathe, you can use a drawknife and spoke shave to bring the stock down to the required size and, there is nothing to stop you leaving the legs with an octagonal profile.
- 2 Once they are at the correct diameter, taper the last 140mm. The taper is a gentle cyma curve from the full 35mm diameter to about 20mm. It can even be a straight taper, or indeed fully concave.
- 3 The top of the legs has a 25 x 30mm turned tenon. If you do not have a lathe, simply mark the diameter of the tenon and the length on the top of the leg. Then saw the shoulder of the tenon (a piece of masking tape on the blade will help with judging the depth of cut). Then with a chisel, chop the waste to the tenon's shoulder line and clean up with a rasp. Regardless of the method used, check the diameter – I typically use a spanner to check diameters.

## THE SEAT AND BACKREST

The top consists of two pieces of 20mm maple.

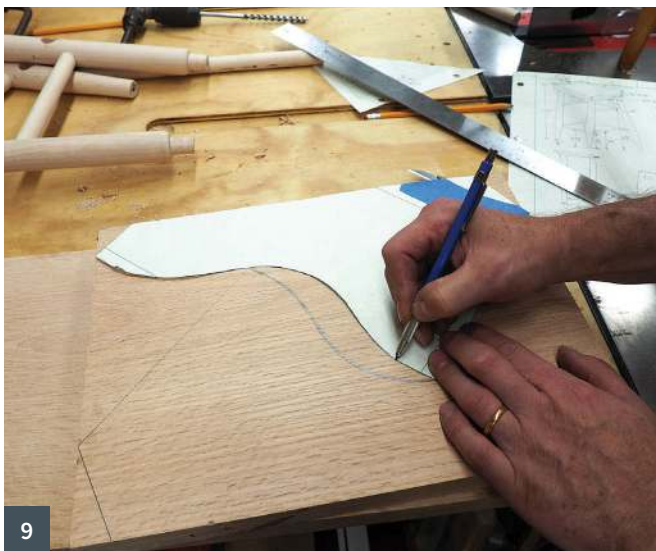
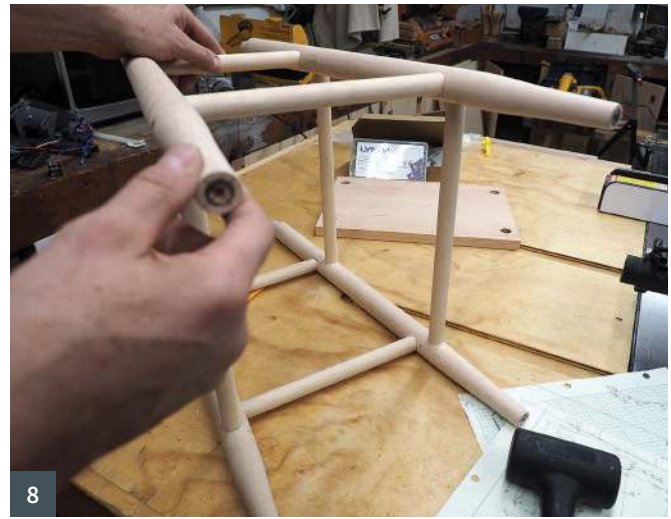
- 4 Cut the wood to size and with an appropriately sized roundover bit (I used a 9mm), rout the four top edges of the top/backrest.

The underside edges need only be eased to remove the sharp edge. The fixed seat just needs its edges eased. I generally use a block plane to ease edges.

## THE MORTISES

- 5 Mark the location of the mortises. From the side the stool legs splay symmetrically at approximately 7° from the vertical. From the front the legs are vertical.
- 6 Drilling these mortises accurately involves a little angle work and the use of a bevel gauge. Set the bevel gauge to the splay angle and tape it in position in the corner of the seat. Now proceed to drill a 25mm hole from the top. It's a good idea to secure a piece of scrap wood on the underside of the board to prevent tear-out. Once all the holes are drilled, test fit the legs and position them so that the best face is forward. This is particularly true if you laminated the legs and do not want the seam to show from the front. With the stool assembled, mark the location of the seven rungs on the legs. The front of the stool only has one lower rung. The rungs are made from 20mm dowels and are seated into a 15mm mortise, again the bevel gauge will help with the angle for the side rungs – the angle is the complementary angle to the splay (90° – the splay angle). The front and back rungs are perpendicular to the legs.





- 7** To drill at the correct angle in the legs that splay, tilt the drill press table to the splay angle and hold the legs securely perpendicular to the tilt. Alternatively hold the legs in a vice at the required angle and drill by hand. Cut all the rungs to the required length adding the 30mm that goes into the mortises.
- 8** Dry fit the rungs into the leg mortises. These should be tight fitting (do not drive them home, they will be hard to take apart). The original stool had very simple rungs without any shaping, of course, there is nothing to stop you adding some embellishments to your rungs.

## THE STEP

Because the step is pivoted between the front legs it needs to be made and assembled prior to putting the rest of the stool together. The step can be created using any joint you want. For simplicity, I opted to use butt joints held together with Dominoes, but a dowel joint would be just as strong. If you decide to do a different joint, such as a dovetail, you will need to allow for the additional 20mm height of the step legs.

- 9** Using the template, draw the outline on your stock so that the grain runs down the leg.
- 10** Cut out the legs on the bandsaw or use a coping saw.
- 11** Fine tune with a rasp and or spoke shave.
- 12** Once the two side pieces are done, drill a 6mm pivot hole through

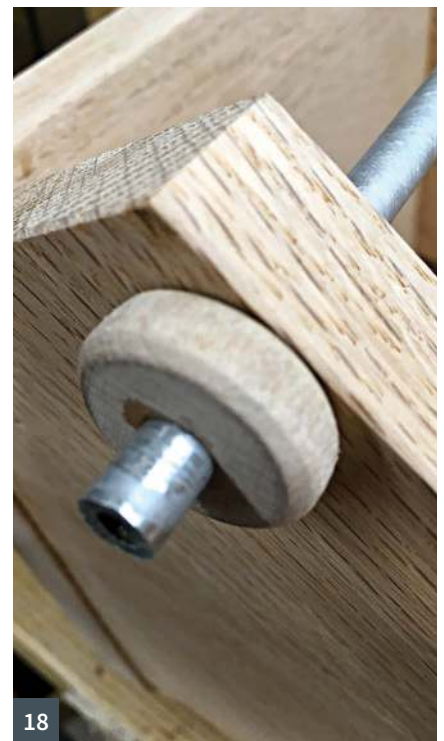
the first leg of the step. Then use this as the guide to drill the hole in the other step leg. Now drill 6mm diameter pivot holes 20mm deep into the inside edge of the two front legs. It is important to get this pivot point in the correct location else the step will not open parallel to the floor and the mechanism will prevent the backrest from opening fully.

- 13** Ease the edge of all the parts with a block plane and sand all the parts of the step.
- 14** Using your joint of choice (I used Dominoes), assemble and glue the parts together.
- Note:** The legs are set back from the edge 3mm to create a small side reveal. If you used dovetails you will need to allow for this.
- 15** In order to glue this step together you may need to come up with some creative clamping techniques. Clean up any glue squeeze-out.

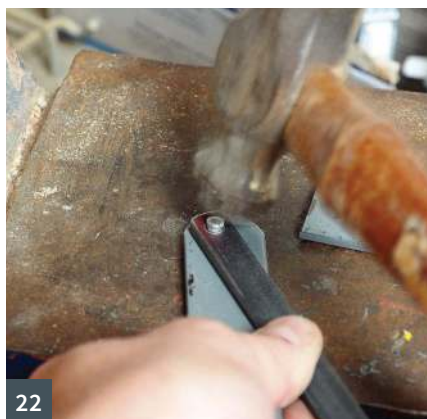
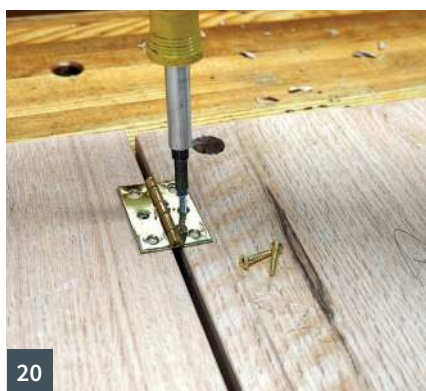
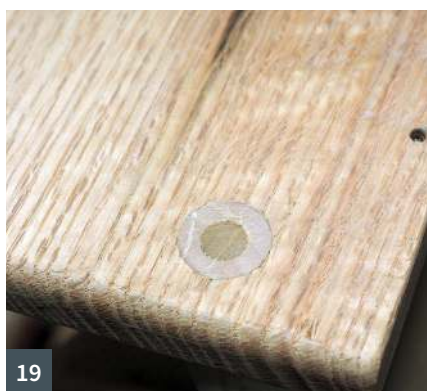
## MAKING A WOODEN WASHER

- 16** So that the step does not rub against the front legs when pivoted, you will need to place a 6mm washer between the stool legs and the step legs. I would suggest a couple of nylon washers, or if you feel adventurous turn them.
- 17** Drill a 6mm hole and then cut them apart.
- 18** Position them on the pivot rod.









## PUTTING THE LEGS TOGETHER

It's now time to put the rest of the stool together. Assemble the back legs and rungs, and then add the side rungs and attach the fixed seat. You may have to persuade the tenons into place – fortunately the splay angle is such that inserting all four tenons is quite easy. Once hammered home, check that all the other joints are well seated in their mortises.

**19** Most tenons are wedged onto the seat, but I wanted to use an unconventional method... I drilled a 6mm hole in the ends of each tenon and glued and hammered a dowel into the hole. This gave a very attractive appearance and did its job of forcing the tenon into the mortise walls.

## ATTACHING THE BACKREST AND HINGE LOCATION

**20** The backrest and the seat are flush at the back and overhang on the other three sides by approximately 5mm. The hinges are surface mounted. (As you can see, I did this step prior to assembling the stool). I like to position hinges as I do for cupboard doors, viz. each hinge is one full hinge length from the edge of the wood. **Note:** when using brass screws in hard wood always use a steel screw first to cut the threads, then use beeswax on the brass screw prior to driving it home with a hand held screwdriver. At this point I gave the whole stool a coat of Danish oil diluted 50:50 with mineral spirits. This was rubbed into the wood, left for a few minutes and then any excess was wiped off.

## THE OPENING MECHANISM

**21** Cut the steel bar into pieces as indicated by the diagram and then

with a file round each of the ends and remove any burrs. The middle section needs to be bent into a subtle 'S' (see diagram) so that it can negotiate the rungs when opening and closing.

**22** Secure the ends by drilling 3mm holes in the centre of each end and rivet together.

**Note:** Make sure that you have secured the steel bar when drilling – it is all too easy for the drill to bind and you end up with dangerously spinning metal – ask me how I know... I used a ball peen hammer to rivet the pieces together. It is only necessary to round over the ends to stop them pulling back through the holes. Don't peen too hard as you will run the risk of cinching the bars together. You want them held together so that they move past each other without any play in the connection. An alternative method is to use round head machine screws and lock nuts. However, these may interfere with the rungs when the top is opened and closed. You will need to experiment a little if you have never used riveting.

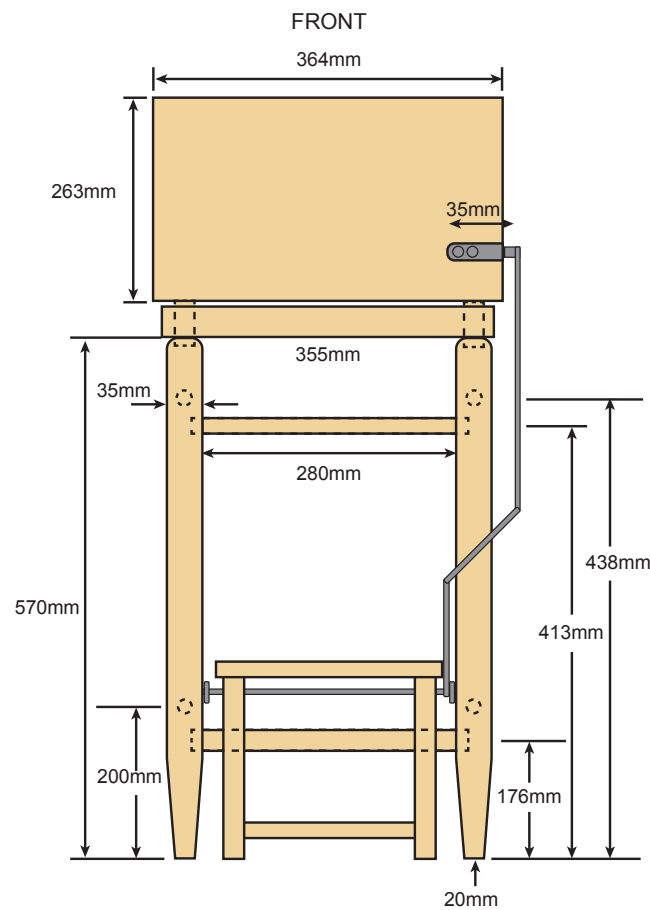
**23** Make an 'L' bracket. The steel I used could easily be bent, but to get a crisp 'L' I needed to heat the steel and then hammer into shape.

**24** Once the linkage is made, drill two holes in the 25mm bar and the 'L' bracket and with the stool on a flat surface, open the backrest and the step and, holding them in the correct location, secure the linkage mechanism in place with screws. I found it easier to secure the bar to the step first and then create the 'S' bend in situ.

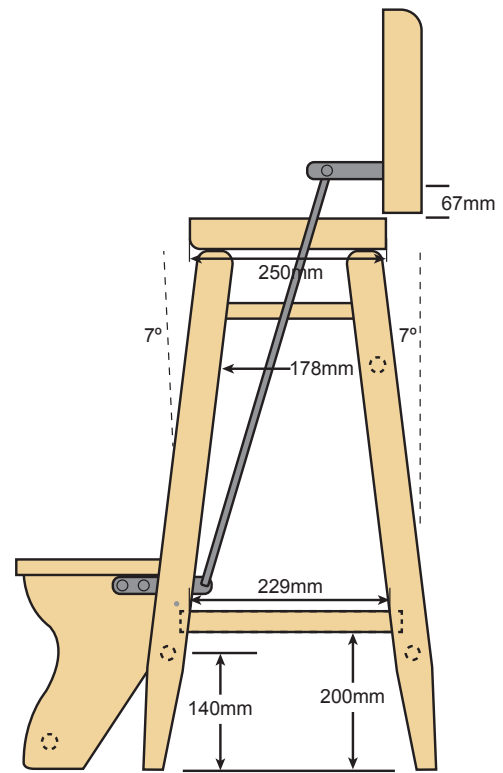
## THE FINISH

You can finish the stool with your finish of choice. Our original stool had many layers of paint that were cleaned off years ago to reveal the original maple. I chose to give this new stool a few more coats of Danish oil. And there you have it – a functional mid-century stool that children and adults will enjoy for generations to come.

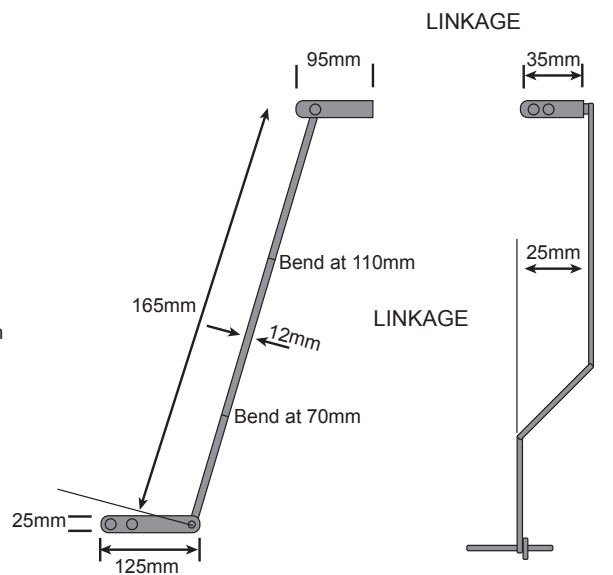
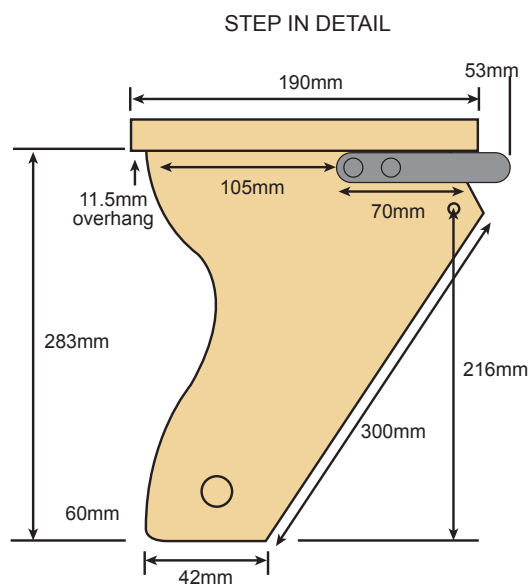
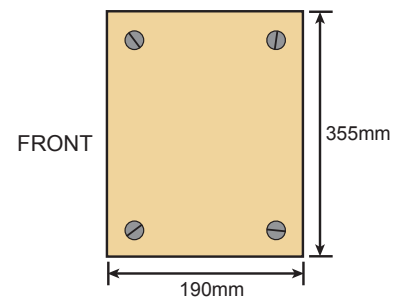




**NOT TO SCALE**



All rungs are 20mm diam.  
All rung mortices are 15mm deep  
All rung heights are measured to the centre of the rung, from the floor



Linkage from side

Linkage from front





# A SEA OF GREEN

With its power to touch each of the five senses and provide a natural boost to wellbeing, forest bathing regularly features in Japan's health programme. Now more countries are beginning to take the woodland path

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You know the feeling. It's been a long, stressful week. Your nervous system is jangled, your jaw is tight, your shoulders feel stiff as a board. You feel burdened with the worries of the world. You pack a bag and head off for an area of forest or woodland. You find yourself standing before a vista of green – trees, of every leaf shape and hue, you glimpse a river winding into the distance, and hear the sound of birds chirping.

You inhale deeply, feeling the clean air giving you a lift. As you begin to hike through the forest, a calm descends on your being, your mood lifts and those worries – well, they seem lessened when balanced against the beauty of the great elemental outdoors.

Nature may be red in tooth and claw, but she also holds the secret to one of the best native medicines for physical, mental and spiritual rejuvenation. The primal health-giving power of the forest.

The restorative power of forests and green space has been recognised since ancient times: 2,500 years ago Cyrus the Great intuitively built lush green gardens to increase human health and promote a sense of calm in the crowded urban capital of Persia. In the 16th century, the Swiss-German physician Paracelsus declared 'the art of healing comes from nature, not from the physician'.





*‘To be poor and be without trees, is to be the most starved human being in the world. To be poor and have trees, is to be rich in ways that money can never buy’*

Clarissa Pinkola Estés



## STRESS-BUSTING ENVIRONMENT

But the Industrial Revolution in the late 1700s created an urban, sedentary lifestyle with more time spent indoors. It also heralded stress-related conditions, heart disease, cancer and diabetes. You could argue that many modern diseases are a result of modern man being ‘tree-deprived’, something Yoshifumi Miyazaki, Japan’s leading scholar of forest medicine, would not dispute. ‘Humans have spent five million years in nature,’ he says. ‘That is 99.9999% of our existence, and yet we’ve spent just 0.0001% in the city.’

Professor Miyazaki conducted the world’s first scientific experiments on the health-giving power of forest bathing. His team studied around 600 participants in 48 forests, from Hokkaido to Okinawa. After a day’s walk in the forest, participants showed an average 12% reduction of the stress hormone cortisol and an increase in relaxation of 103%. Pulse rate, blood pressure and sympathetic nerve activity decreased. Forest bathing had a significant, and lasting, impact on natural killer cells – powerful lymphocytes known to fight off infection and attack cancer growth. Even just 15 minutes spent among trees can strengthen the immune system and reduce anxiety.

‘Forests can lower stress and make people feel at ease,’ says Professor Miyazaki. ‘Humans had lived in nature for millions of years. The body is made to adapt to a natural environment and feels stress in an urban area. But when it is exposed to nature, it goes back to how it should be.’ He adds: ‘Forest therapy is not about curing the body after it develops sickness. It’s about developing a body that does not easily get sick.’

Even just looking at a forest setting or green space can help. Studies in the US found that hospital patients with a view of trees from their windows were discharged a day earlier than those whose rooms faced walls.

In Japan, shinrin-yoku has been part of the national health programme for 35 years. At official forest therapy sites, visitors can have a free health check-up, with blood pressure and heart rate tested on entry and exit so the results can be compared. One such forest therapy base is found at the Akazawa natural recreation forest in Japan’s Nagano prefecture. Among the cypress trees, health-seekers are seen by a forest therapist who notes their pulse rate, sleeping habits, skin temperature and



PHOTOGRAPHS BY SHUTTERSTOCK





emotional state before and after shinrin-yoku. Some sessions begin with yoga-like stretches and breathing, guidance on how to spot beauty in the forest and even a spot of bamboo-flute playing by the therapist to heighten the hypnotic atmosphere.

Yasuo Nishiura, a forest therapist in Japan's Wakayama prefecture, says: 'Forest bathing affects all the senses – sight, smell, taste, touch, sound. It is designed to open your mind and body, from walking on small stones to massage your feet and boost circulation to breathing in forest scents.'

## BRANCHING OUT

Other parts of the world are waking up to the potential of forest bathing. In Oakland, California, Dr Nooshin Razani, a paediatric clinical scientist and nature champion, prescribes a dose of nature to her patients. 'Nature has the power to heal because it is where we are from, where we belong and belongs to us as an essential part of our health,' she says. Americans spend just 7% of their time outdoors on average: 'That's 12% if you include time spent in their cars,' jokes Dr Razani. To counteract stress and social isolation, she takes patients to green spaces, with a park ranger. She says they report feeling happier, more relaxed and smarter as a result. 'When people in

## NATURAL LIFE-SAVER

How spending time in nature can improve mental health

Improving mental health is an area that nature can play a vital part in, as Jim found. He was in his 40s and was working at stressful jobs – as a pub manager, and security in a supermarket. He was feeling increasingly unhappy, which contributed to his marriage breaking down. He left his wife and two young children to live alone. 'I felt as if that pushed me over the edge,' he says.

He began suffering severe anxiety, depression and panic attacks that made him feel 'poleaxed. I would sit in my flat alone, feeling nobody cared, so why should I bother? I was having suicidal thoughts that would be really hard to shake off.'

Jim made two suicide attempts – one time he swallowed pills and whisky, but woke up the next morning feeling worse than ever. On another occasion, he was about to jump under a car when he noticed schoolchildren nearby, which stopped him.

'Thinking about how my suicide would have terrified those kids was a big wake-up call.' He went to his GP, was given anti-depressants and referred for psychotherapy. The therapist suggested Jim try out a scheme near him in Retford called Eco Minds (now Muddy Fork – [muddyfork.org](http://muddyfork.org)), which was part of a national scheme helping people to overcome mental health issues through volunteer conservation and wildlife gardening. He found himself at Idle Valley nature reserve, out in nature, planting vegetables with other people on the scheme. 'We were growing tomatoes, potatoes, runner beans and strawberries. We did weaving from willow, making planters and so on.

'I enjoyed it so much I was going to the nature reserve five days a week, even though it only opens two days weekly. I was really drawn to that place, and to nature. It did me so much good.'

Though Jim didn't live far from the countryside – 'I can be in fields in a five-minute drive' – he hadn't until then appreciated it. 'It hadn't struck me then how the countryside could make me feel much better. The group gave me something to look forward to – meeting people from all walks of life, no pressure, someone sympathetic to listen if I needed them.'

Several years on, Jim is in a better place. 'My mood lifted, my confidence improved. I am more optimistic. The suicidal thoughts declined quite quickly. The depression and anxiety aren't gone completely but they are reduced a lot.' Jim felt a physical change too – more energy and better stamina.

'I still go to the group. Whenever I get back to the nature reserve I feel so much better for the next three to four days. I can't dig like I used to as I have back problems, so I've started taking photographs – close-ups of insects, flowers. Connecting back to nature has helped me immensely. I can't give it enough praise.'



forests reach that “ah” moment, what they are experiencing is fear plus happiness, plus pleasure. Their focus shifts from the internal to the external, anxiety and depression reduce and they have more empathy.

‘Tests on people who do three days of tree bathing show their head clears and the prefrontal cortex resets,’ she explains, ‘therefore creativity and productivity go up, as do empathy, communication and the ability to self-soothe.’

Closer to home, awareness of nature’s healing powers is growing as is the crucial part it has to play in improving mental health. Research by the UK’s Forest School Association found children engaged in woodland settings were more likely to interact and socialise as part of a group and a forest setting can also help kids with emotional problems to stabilise anger issues and improve behaviour. Adults benefit too. People living close to green spaces are less likely to be dependent on anti-depressants and pregnant women also received a health boost from a greener environment, recording lower blood pressures and giving birth to larger babies.

In England, contact-with-nature programmes are being run by NHS Forest and Sustainable Healthcare. Scotland has led the way, however, perhaps influenced by studies that revealed middle-aged Scottish men living in deprived but verdant areas had a death rate 16% lower than their more urban counterparts. Its Woods for Health strategy has been using green spaces ‘to promote better health for all through encouraging regular physical activity and relaxation outdoors’. Scotland’s Chief Medical Officer Dr Harry Burns says: ‘Trees, woods and forests play a key role in helping to promote better physical and mental health for all... where people can be physically active and recover from stress.’ There’s also the economic savings that come from a decreased demand for medical intervention and health care.

Economic status may still reflect how easily you can access green space, though. Deprived communities typically have fewer natural environments in easy reach, according to the Institute for European Environmental Policy. Its director, Patrick ten Brink, praised cities such as Oslo in Norway and Vitoria-Gasteiz in Spain for their initiatives to make nature accessible to all. ‘We should be inspired by this and work together so all Europeans have nature within 300 metres of their homes in the next 10 years,’ he said. ‘We all need nature in our lives.’

Words: Beverley D’Silva



## Want to get more forest bathing into your life? Here’s how...

According to *Countryfile*, these are some of the best forested areas of Britain: Grizedale in Cumbria, between Windermere and Conistone in the Lake District; Hackfall Wood, between the Yorkshire Dales and Moors; Banagher Glen, County Derry, an area of Northern Ireland untouched by deforestation; Pressmennan Wood on the slopes of Deuchrie Dod, in East Lothian; Priestley Wood in Suffolk, home to more than 130 different plants and flowers; Glen Finglas in Stirling, in the heart of Loch Lomond and Trossachs National Park; Coed Ysgubor Wen, Gwynedd, 42 hectares owned by the National Trust; Kielder Forest, Northumberland; New Forest, Hampshire; and Ingleton Falls, North Yorkshire, with spectacular falls such as Thornton Force.

## Other spectacular forested areas include:

### **Horner Wood on the Holnicote Estate in Devon**

This is one of the largest and most beautiful ancient oak woods, with a bird sanctuary, including pied flycatchers and wood warblers, and deer.

### **Colby Woodland Garden in Pembrokeshire**

With sea views, a leafy valley and the tallest Japanese redwood in Britain.

### **Towerhouse Wood in Somerset**

With six acres of special trails, such as the Ty Sculpture (see [woodlandtrust.org.uk](http://woodlandtrust.org.uk)).

### **Falls of Clyde reserve on the Clyde Walkway**

Near Lanark in Scotland. It has four amazing waterfalls and miles of well-marked woodland trails. Spot otters, badgers and more than 100 species of birds.

## Special branch

- The UK Forestry Commission has a holiday branch, Forest Holidays. Its breaks include a stay in wooden cabins in Blackwood Forest, Hampshire; a site in Strathgryre in Scotland, which is surrounded by forest and views of the loch; Thorpe Forest in Norfolk, with a three-hour forest-bathing guided walk; and sites in Ardogartan Argyll, Cropton, Keldy, Sherwood Forest, Forest of Dean, and Deerpark in Cornwall. [forestholidays.co.uk](http://forestholidays.co.uk).
- Glamping experts Canopy & Stars have shinrin-yoku woodland sites, such as one in Powys, Wales, where you can sleep in a tipi in a leafy glade. [canopyandstars.co.uk](http://canopyandstars.co.uk).

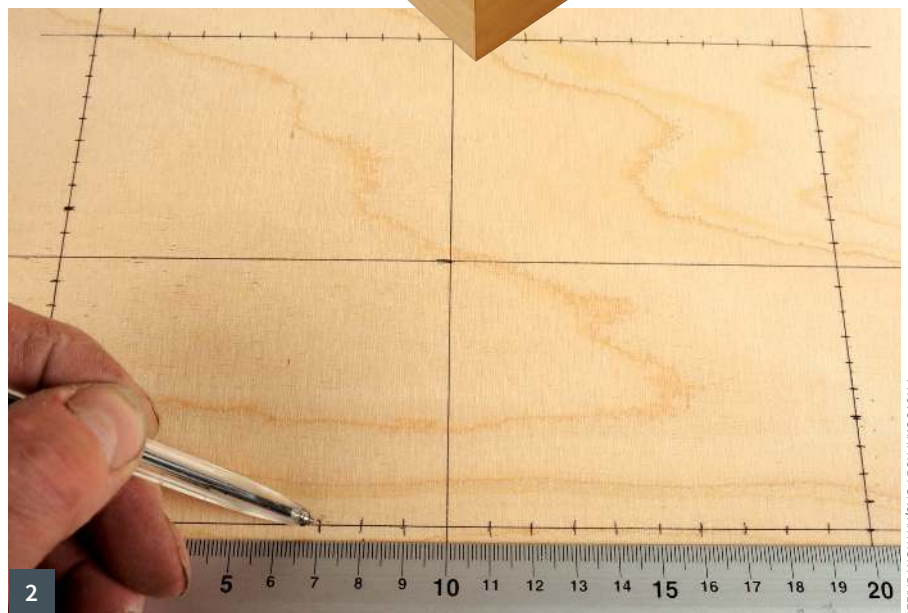




# Routing shapes

Anthony Bailey uses some router tricks to build and decorate this little box

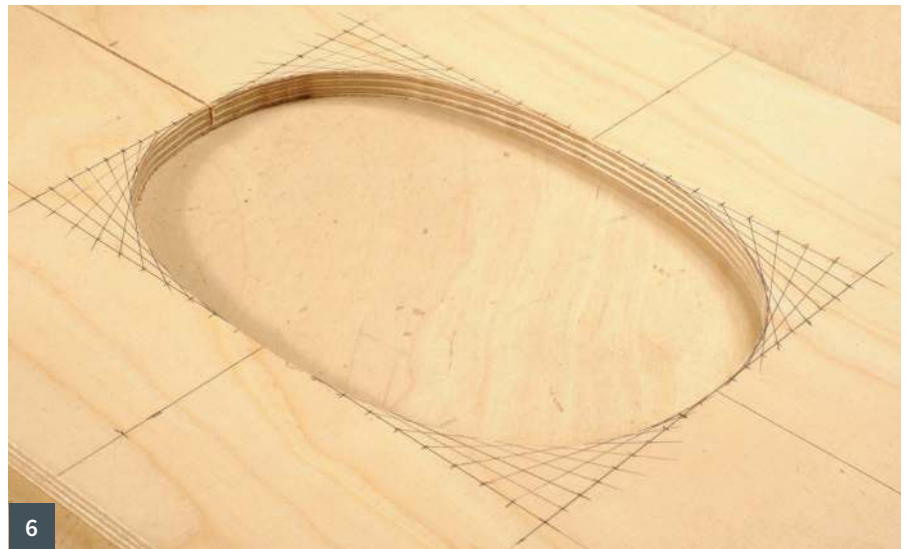
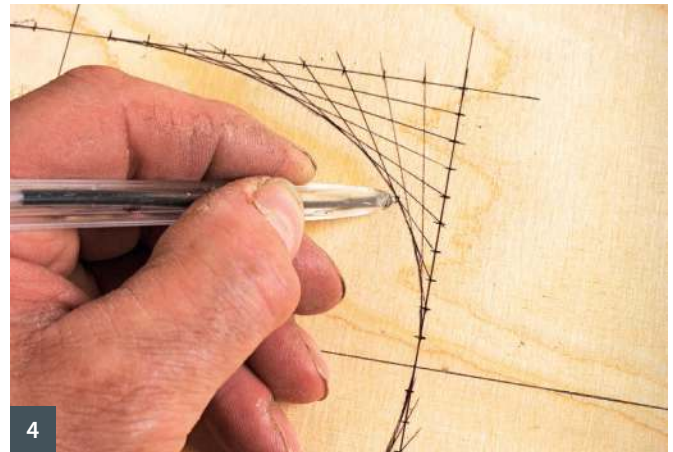
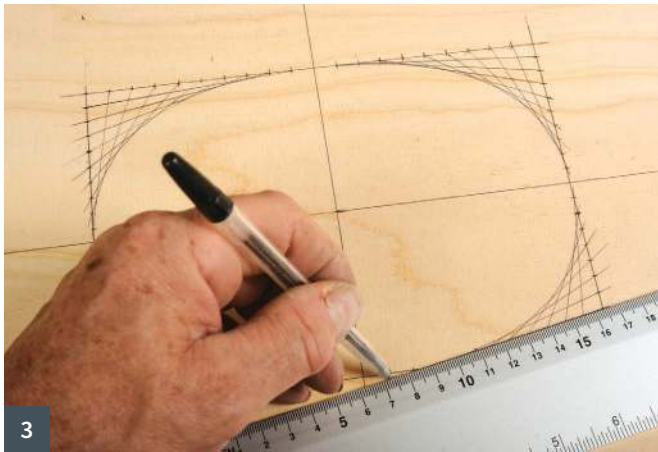
The router is still the most versatile power tool there is. Along with a vast range of cutters, jigs and gadgets – many of which you can make for yourself – it can help produce high-quality woodwork. One way your router can enhance your designs is by adding an inlay shape to an otherwise simple, functional wooden box like this one. Adding this kind of decorative detail is easier than you might think if you have the appropriate cutter kit available.



## THE JIG

- 1 The template could be any shape, such as a swan or a star, but I chose an ellipse because I like the shape. To set it out, draw a rectangle the same width and height as your ellipse.
- 2 Divide each side of the rectangle into an equal number of divisions. I tend to use centimetre spacing for the long sides and reduce the width of each division on the short sides, keeping the number of divisions equal on both sides.
- 3 Use a ruler to draw lines from the first mark after the middle division across to the first mark on the adjoining space, and so on. Carry on round and you end up with something remarkably like an ellipse!
- 4 Smooth the line with your pen or pencil until it appears as a proper curve. Once this is done, bandsaw or scrollsaw very close to the line, doing so carefully to preserve the curve.
- 5 Use a fine rasp or woodfile to give an even, sweeping curve the router can follow.
- 6 The finished template: note the bandsaw blade escape kerf. With large guidebushes this kerf isn't a problem, however the tiny inlaying guidebush we are going to use will require the kerf to be filled with a slip of wood so the guidebush cannot drop into the kerf opening and create a bump in the ellipse.





## THE CUTTERS

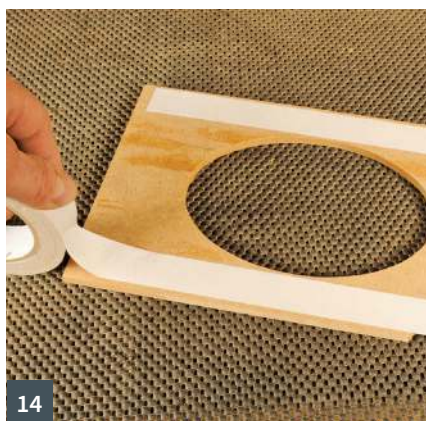
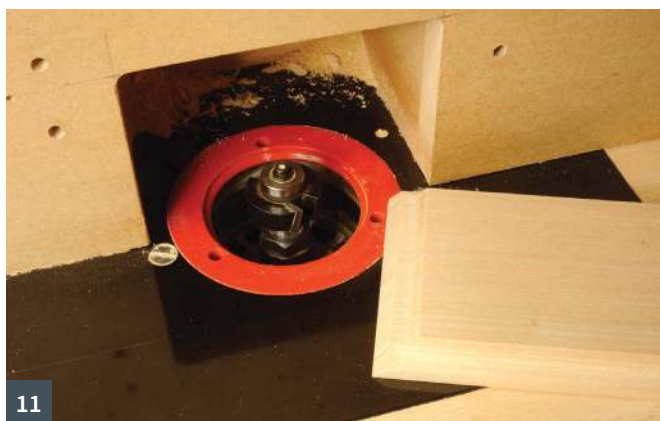
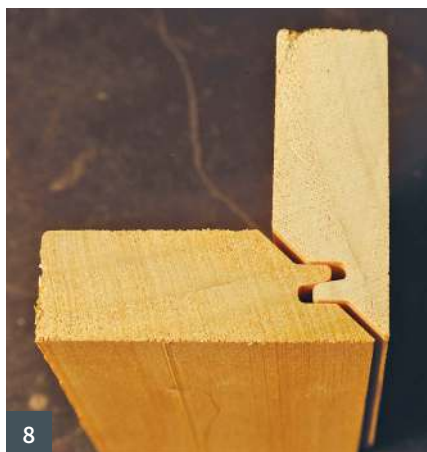
The box corners were joined using an Oldham Viper small lock mitre cutter. All the rebates were made using a Trend rebate cutter, swapping bearings to obtain the correct rebate sizes. The solid carbide inlay cutter and guidebush are from Trend. A Wealden bottoming cutter, designed to clear large areas, finished off the waste removal. Lastly, a Wealden arbor with a thin slitting cutter is used to cut the box from the lid.

## MAKING THE BOX

**7** Decide on the size of box you wish to make. In my case I found a part board of parana pine so the dimensions of the board governed the box size for me. Thickness all stock and finish the sides and ends to size, but leave the top and bottom oversize at this stage. Mark the outside faces at each end so you know that the joints will be cut on the opposite face. **Note:** in the picture, the cutter is already mounted and a breakthrough fence added for vital support across the cutter gap in the fence.







- 8** You must make test cuts on waste wood to get the correct cutter height and fence depth settings for the mitre cutter. I made the test cuts with the grain, which caused problems later.
- 9** The front and back components are machined in the lying down position on the router table, with the finger profile section of the joint in the centre of the workpiece. Note the pushblock behind keeping the workpiece under control.
- 10** I realised that the box ends, which are machined in the vertical position, would drop into the cutter opening in the table. So I resorted to a sub bed – a piece of 6mm MDF. After I had raised up the cutter by a suitable amount, I swung the MDF sideways on to the running cutter so it fitted neatly around it, and then clamped the MDF in place. My test piece allowed me to set the cutter height.

- 11** Before assembly, a rebate for the top and bottom is run along all the long component edges.
- 12** The sides of the box are glued and assembled and clamped square with a board on top to ensure it is completely level. Once dry, clean any glue residue away.
- 13** The box top and bottom are rebated so they will sit flush in the sides. Readers will note I had a sudden change of heart and opted for a darker wood on the top so I could do a light inlay.
- 14** Glue and clamp the top and bottom in place and then fix the template in place with double-sided tape.
- 15** This tiny guidebush and cutter are for inlaying. The internal, or first cut, is done with a special collar in place which is just visible here. It is removed for shaping the inlay itself.





16



17



18



19



20



21



22

**16** The inlay cutter has cut the ellipse, with the guidebush following the template. Then the waste is removed with the Wealden bottoming cutter.

**17** The inlay timber is planed to fit flush in the recess. The guidebush collar is removed and the router run around the template on the inlay timber – don't let the cutter wander.

**18** A test fit revealed I needed to trim the inlay fractionally. A spoke shave proved equal to the task.

**19** Once the inlay is a neat fit, apply an even layer of glue, press it home and clamp it in place with a board and paper insert.

**20** A slitting cutter is used to separate the top from bottom neatly. In this case it didn't quite go through, which is safer as the box won't separate unexpectedly. A fine tooth handsaw completes the cut.

**21** The box lid is rebated by sitting it over the cutter, taking care the bearing and machine screw holding it do not contact the underside of the lid. Place it centrally over the cutter before switching on and only feed into the cutter rotation.

**22** Rebate the top edge of the box bottom so the lid slips on nicely. The corners of the upstand edge must be rounded with a chisel so it fits the rounded rebate in the lid. Sand the box exterior and apply a suitable finish!



# Choosing chisels

We look at one of the most important tools in a woodworker's kit

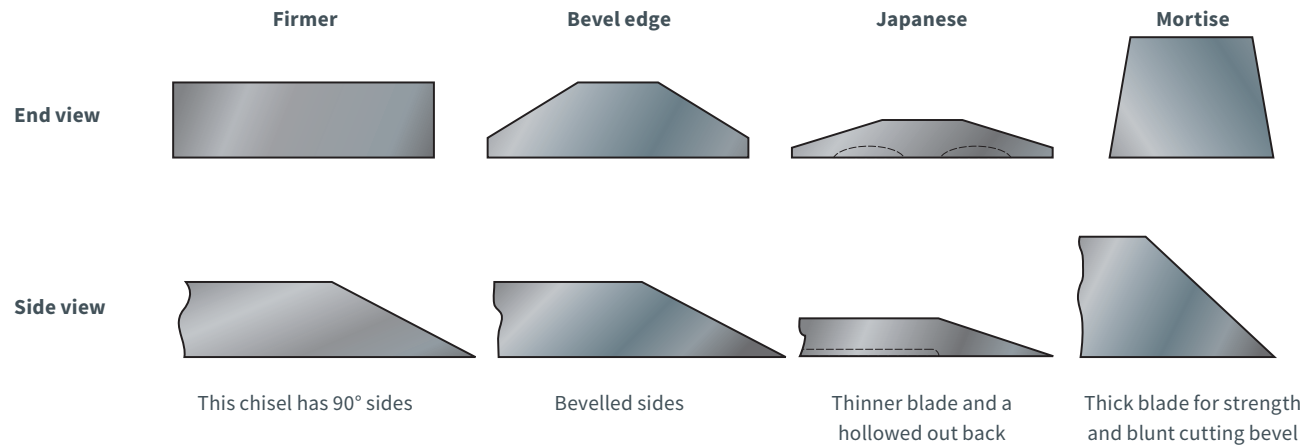
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Chisels are a very important addition to any toolkit, and a good selection of sizes and types will always get a great deal of use. Over the years, the number of different types of chisels developed for specific jobs has been enormous. These days there are fewer types available and, indeed, needed. But even so, your choice of chisels will depend on the jobs you intend to use them for. Here we look at the basic requirements for a toolkit... and then move on to cover some of the more exotic tools available.





## CHISEL PROFILES



### BEVELLED EDGED CHISELS

For your basic toolkit, a good set of bevel edge bench chisels is the basic requirement. In terms of sizes, starting off with a set including a 6, 13, 19, 25, 32 and a 38mm chisel will see you being able to tackle most jobs. The chisels tend to have short blades for maximum control, and the bevels on the sides allow for maximum access to difficult to reach places, such as dovetails. It is probably worth buying impact-resistant resin composite handles, with or without a metal striking surface, if you intend to use your chisels a lot with a mallet.

If you are buying wooden handled chisels, it's best to use chisels with strengthened handles so they don't split with repeated use of a hammer or mallet.

For a basic toolkit, you probably will only need a good set of bevel edge chisels, but as you expand your work and your kit, you should think about getting some more specialised equipment.

### FIRMER CHISELS

Firmer chisels are the oldest type of chisels. They have thick blades with the corners at 90°. They are used for general-purpose joinery and heavy material removal, and are strong enough for any job. They are particularly good for cutting joints where you want to maintain sharp 90° corners. The heavier sides help prevent undercutting preventing looser, poorer fitting joints.



PHOTOGRAPHS BY GCM/ANTHONY BAILEY UNLESS OTHERWISE STATED

**1** This typical bevel edge chisel will enable you to tackle most chiselling jobs **2** This Two Cherries bevel edge chisel with a wooden handle has a metal ring around the top of the handle to stop it splitting after repeated striking with a hammer or mallet **3** This firmer chisel clearly shows the right-angled sides of the blade



## MORTISE CHISELS

A mortise chisel is designed to do exactly what it says on the tin. It is used with a mallet or hammer and is bashed into the wood and then levered out to remove waste. Normal chisels just don't have the thickness to withstand the levering out. The bevel on a mortise chisel is also less acute an angle for the same reason. The chisels are also longer to aid in the levering out of waste material. If you want to cut mortises with one of these chisels, then it is a satisfying pursuit. You can purchase them in a variety of widths to suit your thickness of tenon, but a chisel can also be used to cut a mortise that is wider than the chisel, so you don't have to buy every width of chisel for every mortise you would cut.



PHOTOGRAPH BY JOHN BULLAR

## SASH MORTISE CHISELS

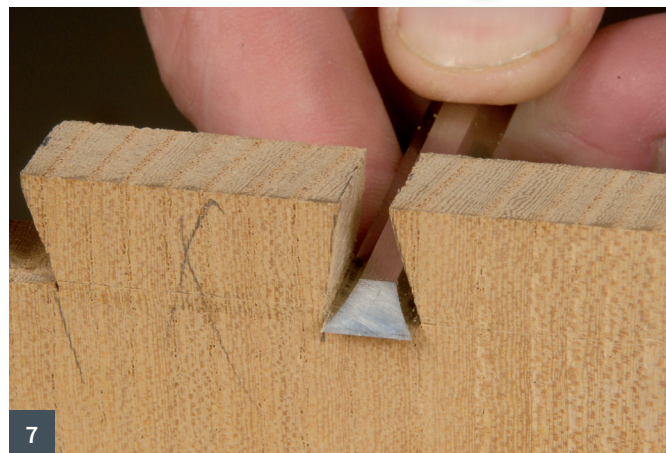
Sash mortise chisels are simply lighter versions of mortise chisels. They were designed for cutting the relatively shallow mortises found in the mullions and muntins of a wooden window. They are worth mentioning here, but not of much use unless you intend on doing lots of windows by hand. There is also a heavy-duty variant of the sash mortise chisel, obviously for slightly larger jobs.

## PARING CHISELS

Paring chisels are long, thin and very light. They are used for shaving off thin amounts of wood when fitting joints, and should never be hit with a mallet – the blades themselves are thin enough to be almost flexible. They have a long length to give maximum control. In use, one hand pushes the chisel with the handle while the other holds the blade and guides the cut, perfect for clearing housing joints.

On a fishtail paring chisel, the shaft of the chisel is narrower than the blade, allowing paring in the most awkward places. Paring chisels also come in the 'cranked' variety: that is, the angle of the handle is offset against the line of the blade. This stops your hands fouling on the workpiece when pushing forward in a paring stroke.

Paring chisels are not necessary for a basic toolkit, but they are very handy to have if you do a lot of joinery.



**4** The mortise chisel has a thick blade for levering out waste material and a blunt bevel to maximise cutting **5** Sorby sash mortise chisel **6** These paring chisels have the typical long, thin blades **7** Here you can see the forward hand controlling the cut with this paring chisel between dovetail pins **8** This fishtail paring chisel has a splayed blade end **9** A cranked paring chisel. The handle is at an angle to the blade which allows long paring strokes





## CORNER CHISELS

We now come to the more exotic types of chisel. These specialist and very high end tools are not really for a starter's toolkit, but are worth knowing about if you develop your woodworking skills in a particular direction. The corner chisel is popular with cabinetmakers. The one pictured is a heavy-duty version. It is used for cleaning up deep corners of mortises or other grooves. Each face is sharpened individually using an oil stone.

## TIMBER FRAMER'S CHISEL

If you are planning on doing any boatbuilding or timber framing, then you'll need one or two of these monsters. Often called a slick, this model by Robert Sorby has an offset blade to allow for clearance when working deep sockets and mortises, and is also used as a heavy-duty paring chisel which, thanks to its cranked neck, can work along any length of timber. This beast has a 60mm blade and its overall length is 690mm. What a whopper!

## JAPANESE CHISELS

Japanese chisels are of a similar size to Western chisels, though often slightly thicker. There are two main differences, however. They have hollow backs to make progress through timber that little bit easier, and they are made of laminated steel, with an especially hardened steel along the cutting edge. This makes for a very flexible, and very sharp tool which keeps its edge. They also then need hooped wooden handles to resist malleting. A special dovetail chisel was introduced for Western woodworkers which is triangular in section and has narrower edges than any Western chisel.

**10** This Sorby corner chisel is favoured by cabinetmakers for getting truly square corners **11** This timber framer's chisel is a massive beast and is used for both chopping out waste and paring **12** Japanese chisels are famed for their strength and sharpness, created by laminating a thin strip of super hard-cutting steel onto strong and more flexible steel





# Three hares of Dartmoor

Woodcarver Zoë Gertner carves a trio of hares

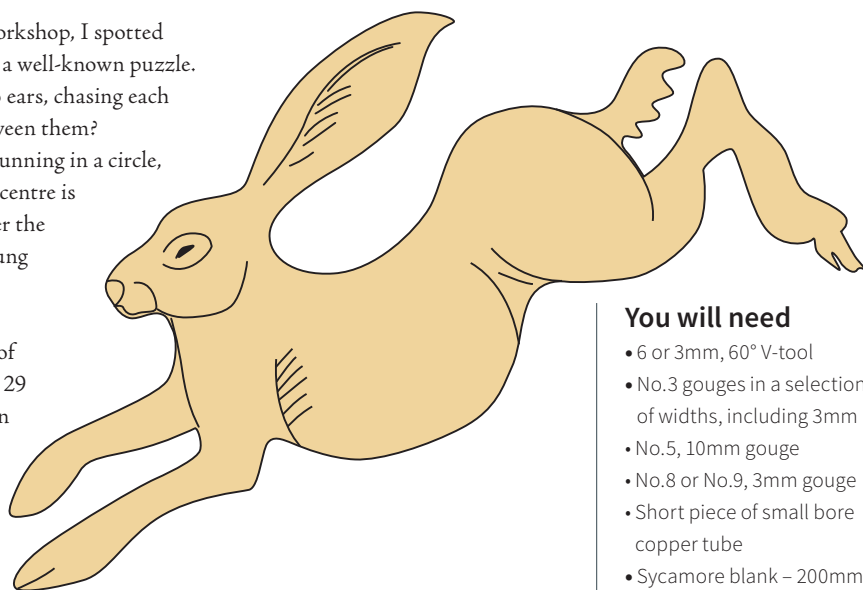


PHOTOGRAPHS BY ZOE GERTNER

Idly gazing across to the big field opposite my workshop, I spotted three large brown hares, which brought to mind a well-known puzzle. How can three hares or rabbits, each having two ears, chasing each other round in a circle, share just three ears between them?

The ancient symbol of three hares or rabbits running in a circle, joined by their ears which form a triangle in the centre is an extraordinary design, and has been found over the centuries from Britain to China and other far-flung parts of the world.

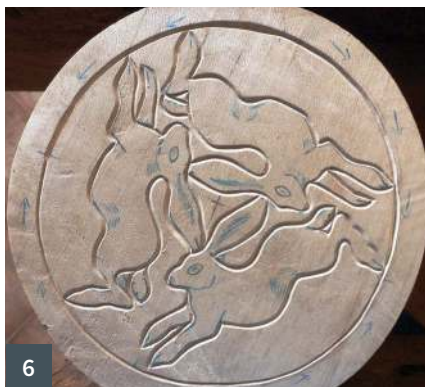
Devon, and Dartmoor in particular, is richly endowed with this symbol carved on wooden roof bosses. The motif occurs in one form or another 29 times, in 17 churches alone – from its association with Dartmoor tin mining, the pattern is known locally as the ‘Tinner’s Hares’ or ‘Tinner’s Rabbits’. To this day the ancient symbol excites, interests and intrigues, and this project shows you how to design and carve your own ‘chasing hares’.



## You will need

- 6 or 3mm, 60° V-tool
- No.3 gouges in a selection of widths, including 3mm
- No.5, 10mm gouge
- No.8 or No.9, 3mm gouge
- Short piece of small bore copper tube
- Sycamore blank – 200mm dia. x 20mm thick





## TIMBER CHOICE

For this carving I used a sycamore turning blank, at approximately 200mm in diameter and 20mm thick. Most timbers such as beech, light coloured oak and lime can be used for a project like this. A lighter coloured wood will show detail more clearly than a darker one.

## STARTING THE CARVING

- 1 First, draw the outline of the leaping hare and tape it down to a piece of card folded in three. Cut around the outline with scissors. This should result in three identical outlines to use as templates.
- 2 Next, mark the centre of the disc and arrange the hares around it.
- 3 With the ears forming a triangle around the centre mark, fasten the cutouts in place and draw around each of them.
- 4 Extend the length of the ears if necessary, to touch the top of the following hare's head and draw a border around the edge of the timber.
- 5 Using a mallet and the V-tool, cut around the circular border. To avoid splitting the wood around the border, align your disc with the grain lying horizontally and start taking your V cuts from the middle of the border circle at a 3 o'clock position. Cut towards the top (12 o'clock) and the bottom (6 o'clock); then repeat from the opposite side at a 9 o'clock position, finishing the cuts at the top and bottom, 12 and 6 o'clock positions.
- 6 Now, carefully cut around each of the three hare outlines with the V-tool.
- 7 Next, cut downwards around the inside of the border with a wide No.3 gouge that corresponds with its curve. Angle the gouge along the edge of the V channel and mark it.
- 8 With a No.3 gouge and holding it with its bevel down, cut towards the border. This will form a deeper and wider V channel. Starting from the 3 o'clock and 9 o'clock positions, work towards the top and bottom of the border.





- 9** On reaching the top and bottom of the carving, make alternate cuts from each side to obtain a cleanly cut channel the entire way around the border.
- 10** Now cut around each of the hares using the No.3 gouges. Rest the cutting edge so it is angled against the edge inside the V channel cut before, and cut downwards around the outlines. Be sure to turn the gouge as necessary to match the curves outlining the three hares.
- 11** Again, with its bevel down, use the No.3 gouge and cut towards the outlines. Angle the gouge to meet the previous cuts made. This will deepen and widen the V channels around the hares, seemingly bringing them forwards in the carving.

### Removing the background

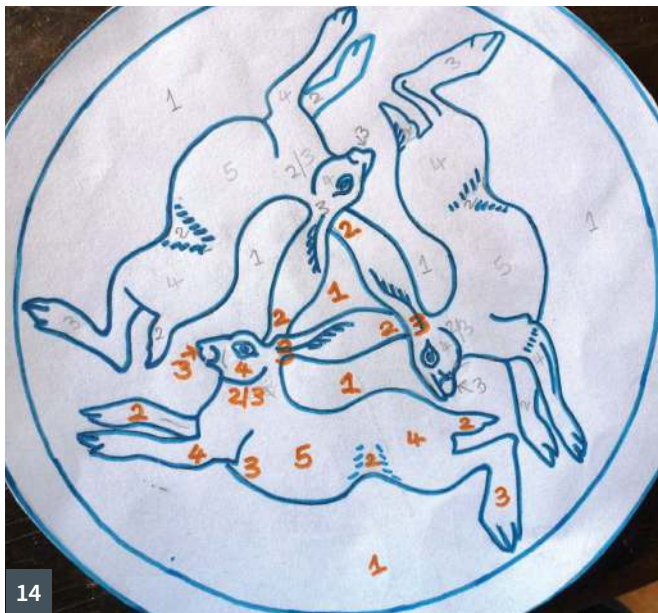
- 12** Using a No.3 or No.5 gouge, start removing the background by cutting towards the edge of the widened V channel and work successive, overlapping cuts. Do this until you reach the middle of the area to be removed. Now turn your carving around and repeat the process from the opposite channel.
- 13** Now, carefully remove the small peak remaining in the middle of the area. Smooth the surface between the border and each of the hares with the No.3 gouges.

### Working out the levels

- 14** The easiest way to work out the different levels is to denote the background areas as 'No.1' – these are the deepest areas of the







carving – which you should have removed already. The next deepest is then denoted as 'No.2', i.e. the forelegs and the tips of the furthestmost ears adjoining the head of the following hare. 'No.3' are the tails and the tips of the noses, and so on.

**15** Now, with the No.3 gouge, cut along the edge of the top of the head, then with shallow cuts, reduce the tips of the adjoining ears. Reduce the foreleg and tail in the same way.

**16** Round over the edges of the ears and hollow them using the No.8 or No.9, 3mm gouge.

**17** Cutting with the No.3 gouge from each side, carefully reduce the waist areas to a hollow between the haunch and the ribcage. Then reduce the neck areas below the jawline.

**18** Round over all edges and reduce the No.3 areas, i.e. the hind leg, tip of the nose, base of the nearer ear and the area of the ribcage behind the nearer foreleg. With the No.3, 3mm gouge, reshape the lower edge of the tail so it is crimped. Work over the whole animal so that none of the original surface remains, reducing the No.4 areas at the same time.



## The eyes

**19** Draw the oval-shaped eyes on the head. Its outline can be cut either using a 3mm V-tool, or as shown, by means of a homemade punch. Having cut a short piece of microbore copper pipe, squeeze it to an oval shape in a metalworking vice, then file the edge sharp so it will indent the wood when tapped with a light hammer. Complete the eye by lightly tapping a nail punch within the ovals to bring them to life.

## The toes

**20** For detail on the hares, mark a line on each hare's foot using the 3mm V-tool.

## Finishing

**21** Remove any deep gouge cuts in the background surface and cut

clean all meeting edges. The background can be scraped using the edge of a surplus No.3 gouge that has a burr honed along its cutting edge. For finishing, I left my hares tooled to contrast with the smooth background of the carving. However you choose to leave the hares, apply a coat of wax polish, and then buff the carving with a lint-free duster.

**22** Your final carving should look something like this.

## Top tips

- 1** Cereal packet cardboard is ideal for making the hare template, as the outlines of the pattern can be cut out easily using scissors.
- 2** To make a clean channel inside the top and bottom of the concave edge of the border, use alternate cuts from each side of the border and finish your cuts at the middle of the curve.





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 hammer with a black head and wooden handle is positioned. On the right side, a large circular saw blade is partially visible. At the bottom, there are more tools, including what looks like a drill bit and a black handle.

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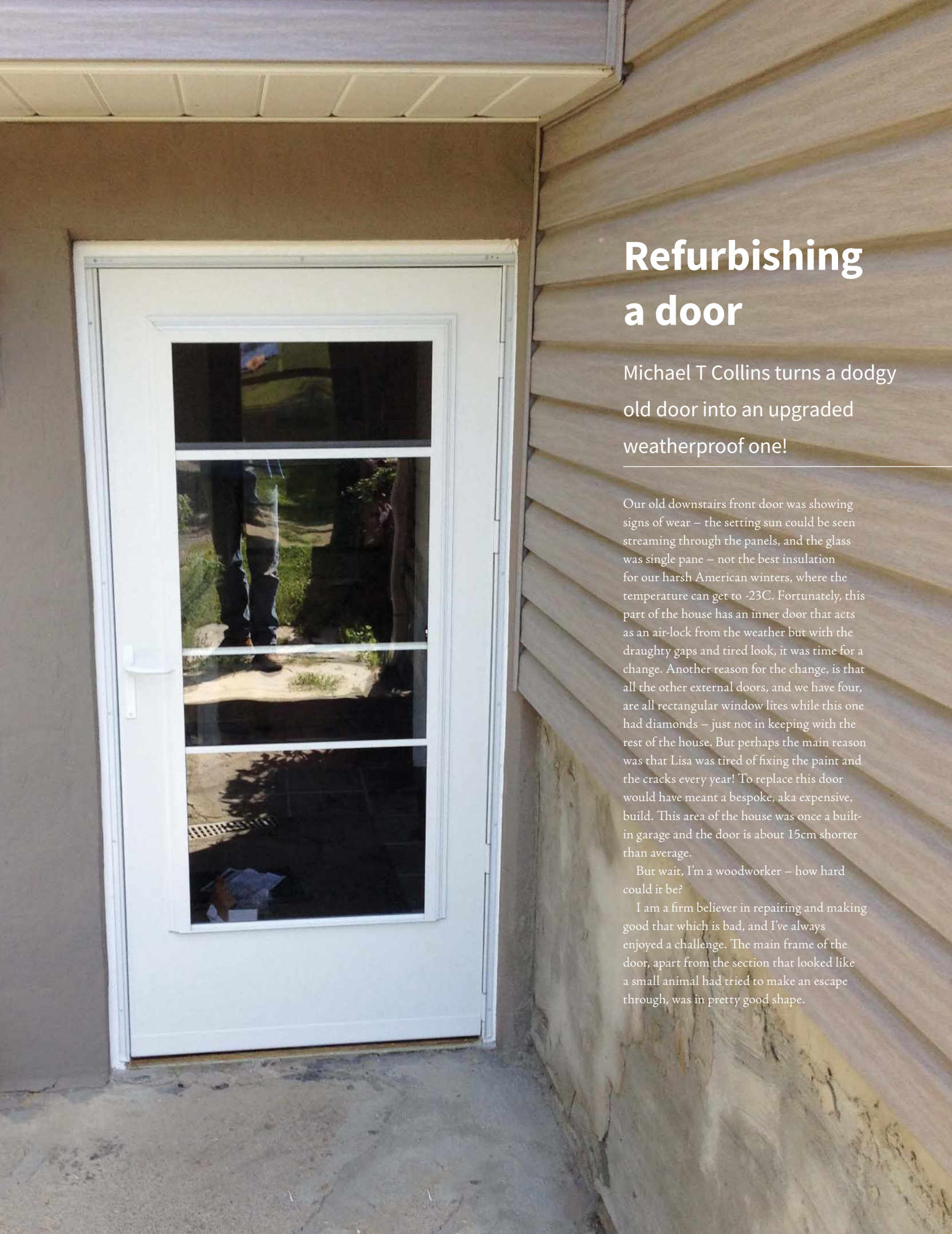
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## Refurbishing a door

Michael T Collins turns a dodgy  
old door into an upgraded  
weatherproof one!

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Our old downstairs front door was showing signs of wear – the setting sun could be seen streaming through the panels, and the glass was single pane – not the best insulation for our harsh American winters, where the temperature can get to -23C. Fortunately, this part of the house has an inner door that acts as an air-lock from the weather but with the draughty gaps and tired look, it was time for a change. Another reason for the change, is that all the other external doors, and we have four, are all rectangular window lites while this one had diamonds – just not in keeping with the rest of the house. But perhaps the main reason was that Lisa was tired of fixing the paint and the cracks every year! To replace this door would have meant a bespoke, aka expensive, build. This area of the house was once a built-in garage and the door is about 15cm shorter than average.

But wait, I'm a woodworker – how hard could it be?

I am a firm believer in repairing and making good that which is bad, and I've always enjoyed a challenge. The main frame of the door, apart from the section that looked like a small animal had tried to make an escape through, was in pretty good shape.





The old front door



The inner door acts as an airlock



**1** The first step was to assess the door **2** All the moulding was removed and the glass was saved, glass works very well as a paint scraper and in a pinch, is a great card scraper (for safety, I tape all the sides my fingers will touch) **3** Typical of wooden windows, these were put together without glue, making it fairly easy to take them apart





**4** Once all the window frame pieces were removed, I needed to remove all the old glazing nails and putty **5** I don't remember who said it to me, but I've always remembered the advice: 'Work in a nice, clean environment – especially the floor'. Yep, you've guessed it, a small sliver of moulding went flying and it took a few minutes to track it down **6** The lower panel was made with the same dimensional wood as the door's frame. This too was outdated and the four equal isosceles triangles (this is where the light was entering) had to go... **7** As can be seen from photo 7, this door was made from some slow growing pine. In this 5cm thick block there are 125 growth rings. They don't make trees like that anymore. I thought I was going to be able to remove the diagonal pieces as easily as the window frames, but they proved to be much harder as they were assembled before the outer frame was assembled. I cut through one of the diagonal members and was able to remove (with some force) all the pieces **8** Once all the panels were out, it was clear that the frame was very loose and that the window and the lower panel were keeping the door together. It was at this point that I decided to take the frame apart **9** The door was cope and stick construction reinforced with dowels, but still no sign of glue. I can only surmise that over the years, with the door being exposed to the elements, that the movement in the joints had broken down the glue and it had simply dried and fallen out. If you look carefully at photo 9 you can see that on the backside of the



door (the brown side), the stick moulding was applied after, rather than being routed at the same time as the rest of the profile in the usual cope and stick process. Why that would be is a mystery to me — if you have any insight, please let me know





9



11



10



13



12

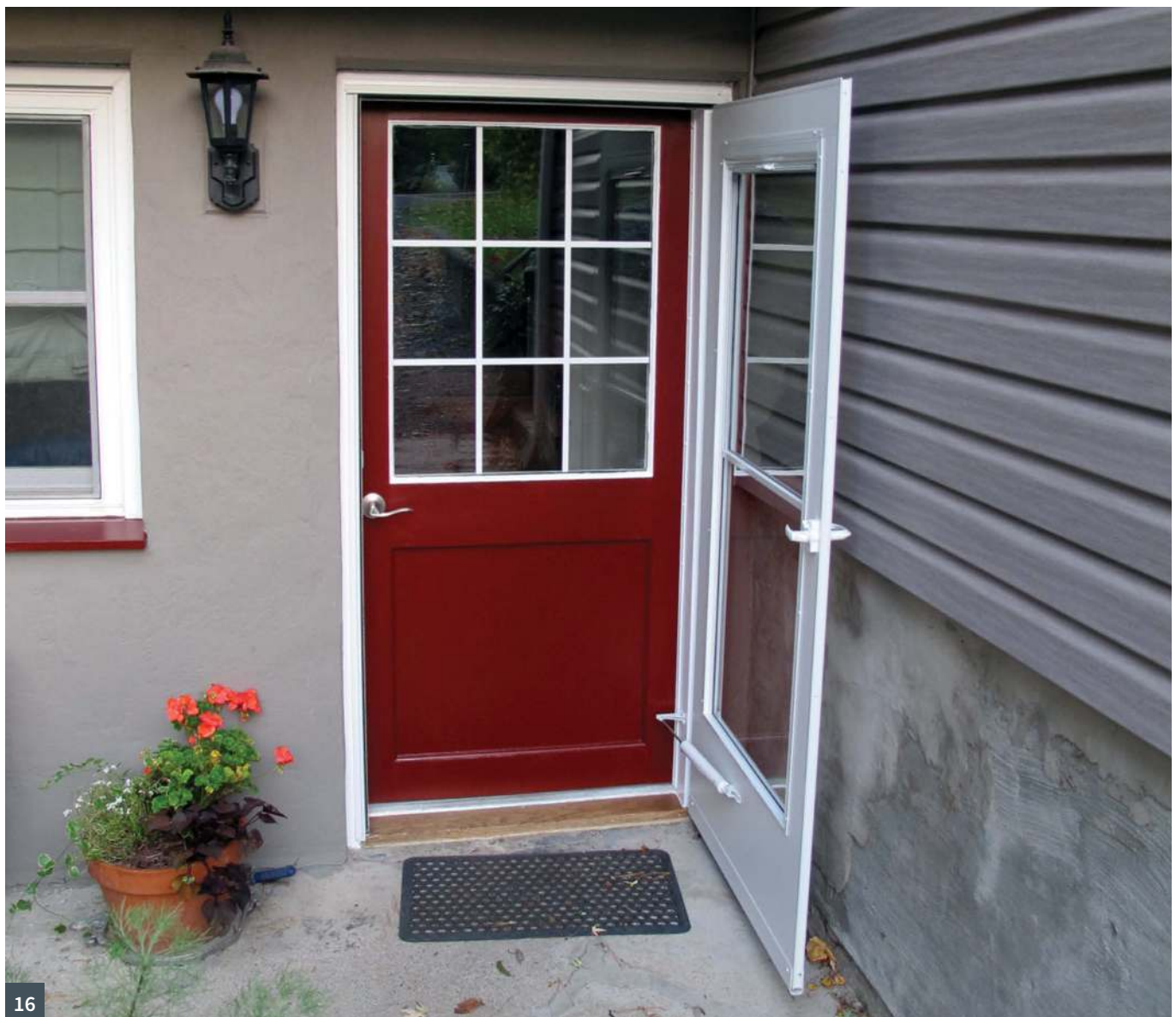
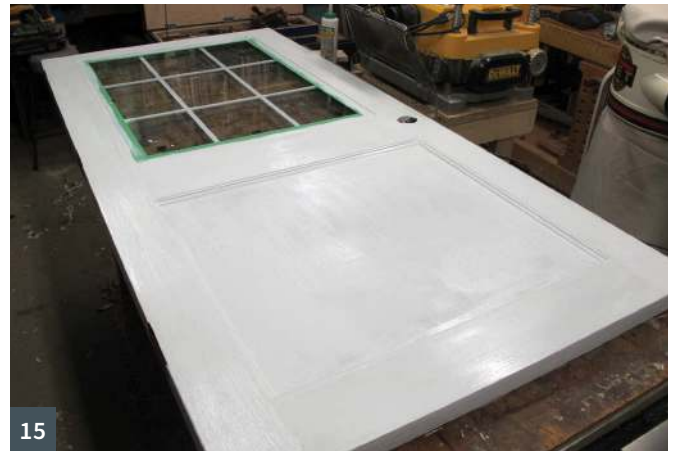
**10** It was just a simple matter of recreating this moulding on the router table using a 12mm quarter round and raising the cutter so that it created a 3mm reveal. As the door was going to be painted, I was only concerned with using some straight grained pine without knots **11** The next step was to clean up all the edges with light sanding... **12** ... and replace and glue any broken dowels **13** The whole frame was then glued back together using waterproof glue and clamped flat by clamping the frames to the sash clamps. Once the glue was dry, the whole frame was sanded to remove the old paint from the outside and the brown stain from the inside. Our house was built in 1963, and so the original exterior paint likely contained lead. For this reason, I wore a mask to remove the old paint on the door. Health and safety should be considered when sanding anything. The whole door, including the back, front and all edges, were given one coat of a good quality primer



**14** For the lower panel I used a piece of 12mm furniture grade ply. This was glued into the recess and the new moulding glued on top **15** The upper panel was the only expense in this refurbishment. I bought a nine Lite 15mm thermal window and placed this into the upper recess. Again,



a new moulding was cut, mitred and glued into place and a white top coat was applied **16** The exterior side was given a coat of paint to match the other doors on the house. A new storm door was installed to give additional protection for the next 50 years





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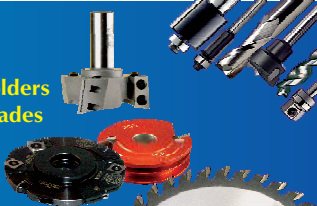
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# Natural edge table

Kevin Ley reveals how he made one of his show pieces



After selling all my display pieces in one successful summer season, I needed to produce some more for the next summer's shows. The unique selling points of my work are my bespoke designs and the wood I select, so I wanted to create an unusual design in a suitable timber.

## TIMBER SELECTION

Burr elm has always been a favourite of mine, making unusual and eye-catching pieces that have always attracted attention, sold well and brought in potential clients. Unfortunately, it is very difficult to find these days and I had nearly finished the stock in my timber store. I rummaged through and found a few pieces from the same log with a high proportion of sapwood, but very good figuring right through the heart and sapwood. However, there were several pieces of in-growing bark and dead knots as well as other faults. I had left these pieces for about 15 years in the store thinking that one day I would find a way of using the sound parts and incorporating the sapwood into a design. This was the day!

## DESIGN AND MARKING OUT

1 I laid out the pieces and had a good think about the design. Some pieces could be joined together with sapwood on both outside edges and heartwood in the centre. There was just enough to make a small coffee table. The top could be finished with breadboard ends to complete the line of sapwood round the outside. There was not even enough leftover to make stretchers for the legs, but I found a small segment of burr that was an ideal shape to be cut into brackets to brace the legs. I decided to keep the natural edge of the timber

and lightly flame it with a blow torch to give a nice contrast to the edges. I was pleased with the design – it came from the wood and maximised its unusual characteristics.



PHOTOGRAPHS BY KEVIN LEY





- 2 I marked and cut out the timber carefully, avoiding faults where possible and selecting the best faces to be on view. All the pieces were cut a little oversize then faced, thickened, and stuck and stacked in the workshop.

## REPAIRS

- 3 There were a couple of pieces of dead in-grown bark on the underside of the pieces destined for the top. Fortunately they did not go right through to the upper face so I decided to remove the bark and fill the holes with burr inserts cut from scrap. To do this the hole was enlarged slightly and the edges softened using a router following a cutout pattern with a guide bush. A piece of acetate sheet was laid over the hole and a suitable shape drawn on, allowing an offset for the guidebush.
- 4 This was transferred to a piece of hardboard and the hole cut with a jigsaw and finished with a round file.
- 5 The pattern was used to rout out the bark hole and then used

to rout another hole in a piece of hardboard. This second hole is an exact copy of the new bark hole, and was used to mark a suitable piece of burr as an insert.

- 6 This was cut out (slightly oversize) on the bandsaw, shaped carefully with chisels and planes, glued up, tapped into the hole and planed flush. It was not a perfect match but as it was on the underside of the top it was quite acceptable.

## CONSTRUCTION

- 7 The two main pieces for the top were trimmed to exact size and butt jointed together. The wild grain in burr can mean that short grain is glued to short grain, weakening the joint. As a precaution against this weakness, I reinforced the joint with biscuits.
- 8 The natural edge made it difficult to clamp up without damaging the edge so I packed the clamp jaws with a hard upholstery foam. I still could not get a lot of pressure on the joint but I had hand planed the edges particularly carefully so not much was required.





- 9** Breadboard ends are used to cover end grain and brace across the grain to prevent cupping, in particular on old-fashioned breadboards, hence the name. However, as the seasonal movement of woods is across the grain and not along it, care must be taken in how they are attached. On breadboards they are usually on a tight, but not glued, tongue and groove, fixed in the centre with a glued dowel or a screw, where there is no relative movement.
- 10** I adopted the same principles using two glued Dominoes at the centre, dry biscuits on the outer edges to locate the ends and prevent cupping of the top, with double countersunk pocket screws, to allow movement, along the whole of the edge to pull the ends up tight.

- 11** The joint was clamped at the centre, again packing the clamp jaws with hard foam, to push the glued Dominoes home while the rest of the joint was pulled up by the pocket screws.
- 12** The double countersinking of the pocket screw holes allows for seasonal movement while still keeping the joint tight.
- 13** I had used my Trend pocket screw jig to cut the pockets, and now used the Trend pocket plug cutter to cut suitable plugs from scrap, matching the colour of the area to be plugged.
- 14** These were glued and tapped into place, trimmed with a flush cutting saw and then sanded.





15



16



17



19



18



20



21

**15** With the ends fixed, I now trimmed and shaped the corners to mimic a natural edge between the ends and the sides of the top. I used a jigsaw, round Surform file and abrasive sheet glued to a dowel to create a natural shape corresponding to that of the sides.

**16** The difference in colour would be masked by the flaming.

**17** The legs were made in a similar way to the top but without the breadboard ends. A cutout – again mimicking the natural edge – on the bottom of the legs, formed the feet.

**18** This was done with a jigsaw and finished with a small drum sander. Biscuit slots and screw pockets were cut in the top of the legs for the joint to the table top.

**19** The screw pockets were placed so that they would be covered by the brackets.

**20** The two flat sides of a segment of burr were planed to a true right angle on the surfacer. Cuts were then made on the bandsaw, through the segment, to form triangular pieces with two flat edges at right angles, and the hypotenuse with a natural edge.

**21** Biscuit slots were cut on the square edges to correspond with the slots in the legs (see step 26).





## FINISHING

**22** The whole table was now belt and orbital power-sanded down to 150 grit.

**23** The natural edges were power-brushed with a flap abrasive brush to remove any loose matter, and bits of bark were picked at and removed with an awl.

**24** All the natural edges were then flamed with a blowtorch. Blowtorches and wood workshops do not mix well, and I took great care to make sure the workshop was clean, no sawdust or shavings about. All cans and bottles were sealed and stored, and the fire extinguisher was serviceable and handy. On the bench I had a spray container of water to douse as I went along. The blowtorch was played along the edge until the colour changed, and if sparks started, the water spray was used. Once it was dry, the edge was wire-brushed to remove any loose charcoal.

**25** Next all pin knots and other faults were filled. I use proprietary

fillers and adjust the colour with earth pigments if necessary.

A cheap plastic artist's palette is used for mixing and palette knives used to press the filler home. It is relatively easy to get a good result on burr – it already has plenty of variation of colour, grain and figure, so any filling can be blended in. It is far more difficult to hide a filled fault on a plain wood. It is usually best to make any filled areas slightly darker than their surroundings. The filler was packed in and left a little proud of the surface and, once thoroughly dry, it was sanded flush.

**26** Biscuit slots were cut in the top to correspond with the slots in the brackets and leg tops. The top was placed upside down on padded battens on the bench and glue was applied to the biscuits and slots in the first leg end.

**27** This was then offered up to the top, pushed home, and lightly clamped in position at right angles to the top – this was checked with a large roofer's square. The screws were driven home in the





pockets to pull the joint up. The second leg was fitted in the same way. Once the glue had set the biscuits and slots for the brackets were glued up, the brackets pushed home, lightly clamped in place and left to set.

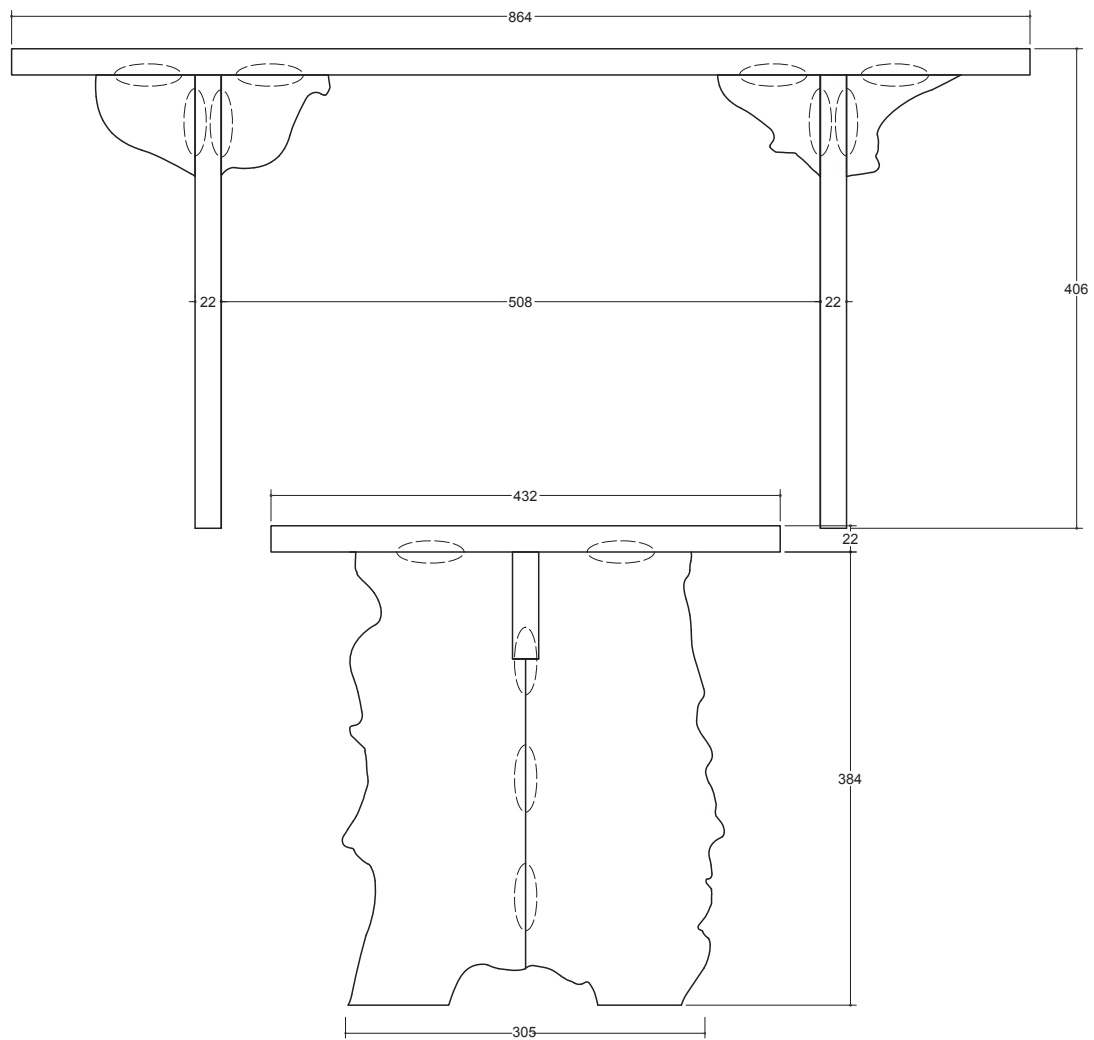
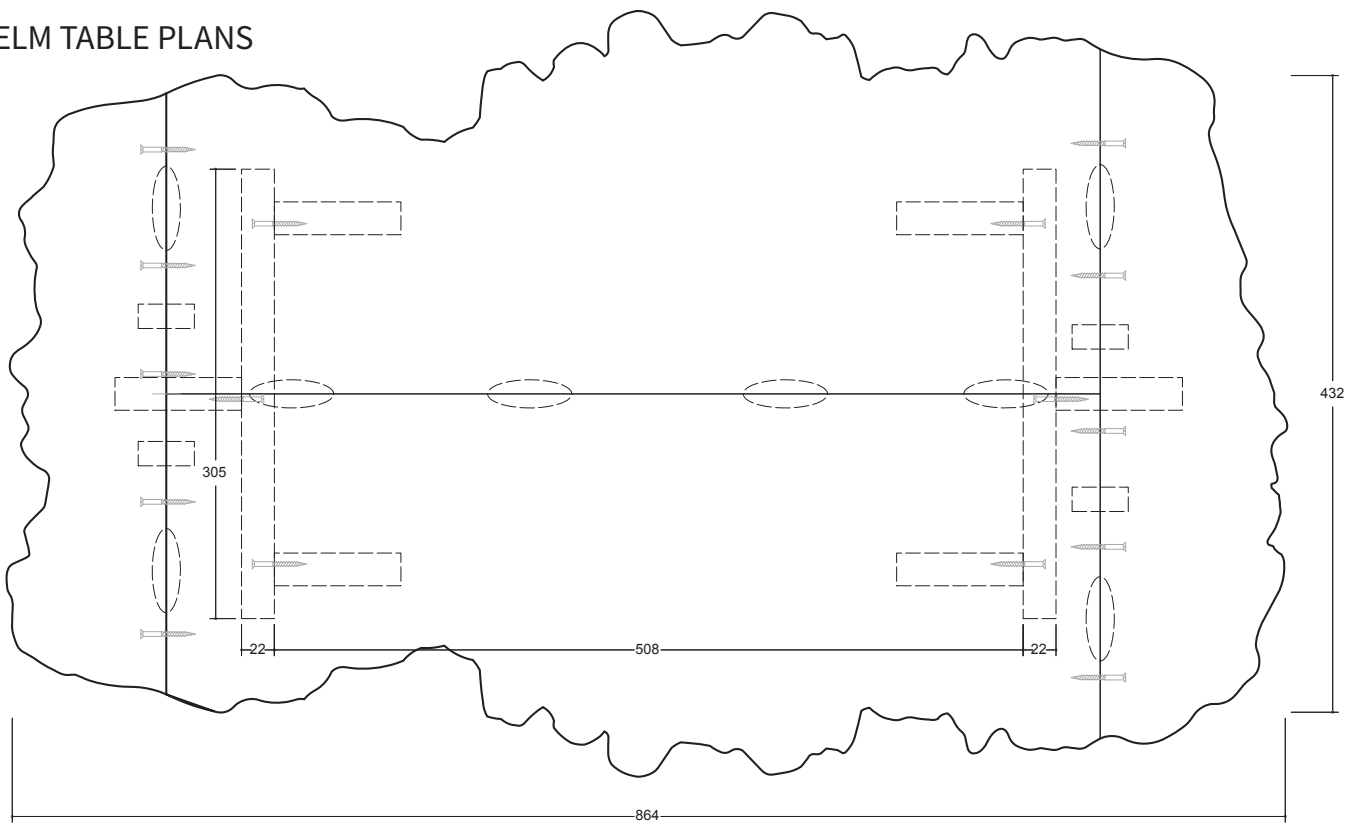
**28** I used a wax filler stick to fill any smaller defects, which were rubbed off as I went along. The burr was very absorbent in places and not so in others. To make sure the porous areas filled up, I applied Liberon finishing oil, diluted 50/50 with white spirit and applied very generously until the wood would take no more. It was left for about 20 minutes, vigorously rubbed off with absorbent cloth and left to dry. Careful inspection the next day found some dull spots on the surface, mainly on the filled areas and where the grain was so wild that there was some end grain on the top surface. These dull spots in an oiled finish don't show up until the first coat is applied and can be a real pain to deal with – but I had a plan!

**29** Liberon's water-based work top finish and seal can be applied to previously oiled wood and is ready to sand in 30 minutes. I applied some with a small paintbrush to the dull spots and end grain and, 30 minutes later, lightly sanded it down to the same finish as the surrounding areas. It worked perfectly as a sort of grain filler and sealer. Several further coats of undiluted oil were applied at 12-hour intervals until the right finish was achieved. The sapwood lost its white glare and turned a golden colour, blending nicely with the heartwood. It was left for a few days and given a final buffing.





# ELM TABLE PLANS





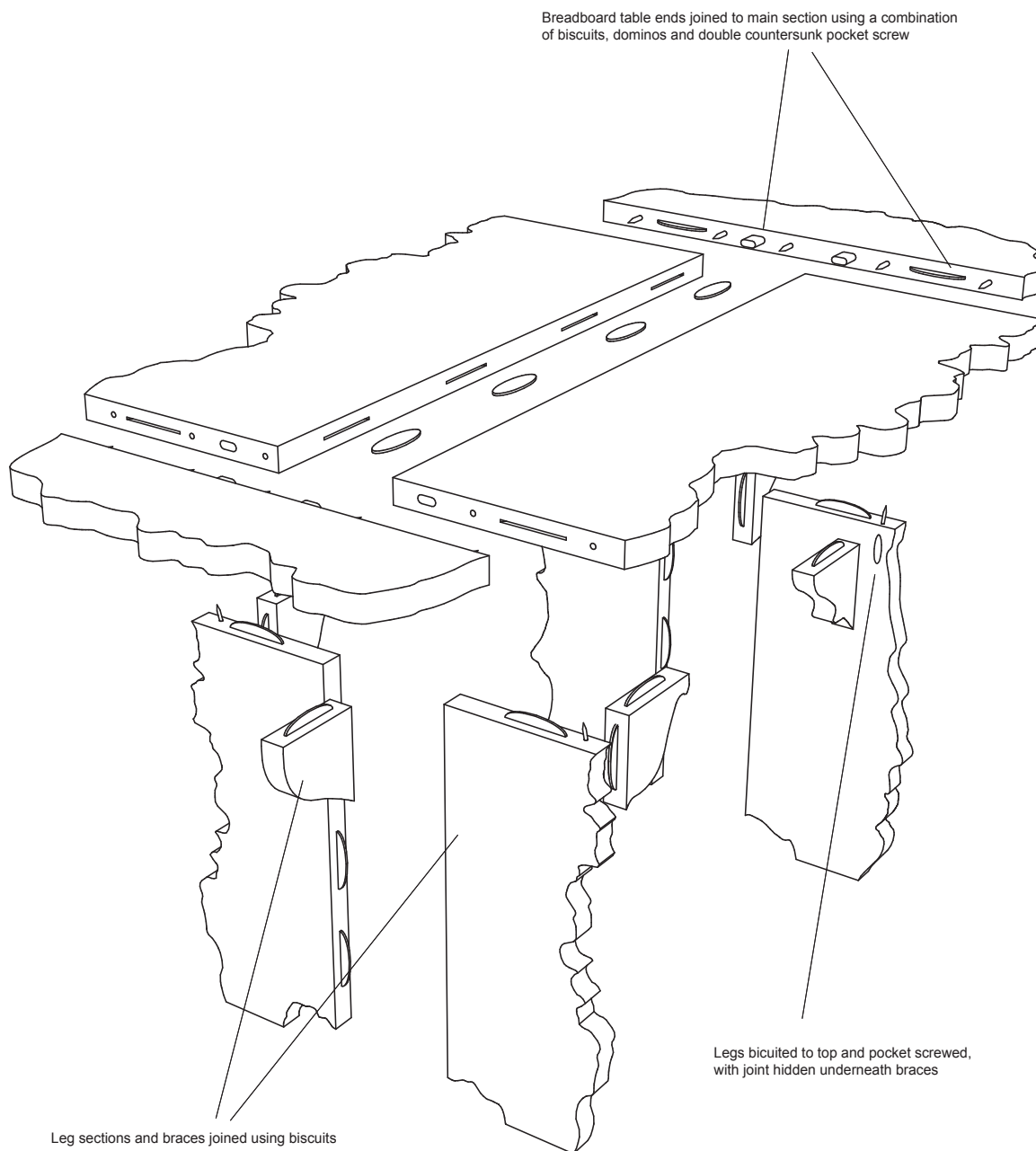
## CUTTING LIST

**Top:** 1 @ 864 x 432 x 22mm

**Legs:** 2 @ 384 x 305 x 22mm

**Braces:** 6 @ 90 x 90 x 22mm

Sizes are overall dimensions and  
do not show component parts





# A beautiful sewing box

Francesco Cremonini employs plenty of craftsmanship to make a box that tests your skills

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What makes boxes one of the favourite projects for anyone who likes woodworking, is that they can be made in a short time, with a few tools and not much noise! Also, they require very little material and the costs are low, in fact sometimes it might cost nothing if you're using offcuts or, as in this case, some spare parquet boards.

For this project you need three boards, one in maple for the interior and two in afzelia and wenge for the exterior. The lid is made from maple and maple veneer. There are several challenges to overcome in order to build the box, but this adds a little flavour to the making, and the satisfaction of testing your skills will make the process much more interesting. You will need a lot of concentration and knowledge of the materials to be able to anticipate the effects of the work, because on small objects like this it is very difficult to hide mistakes.

## YOU WILL NEED

- 4 aluminium rivets Ø2.5mm
- 4 brass screws 7 x 2mm
- Table mitre saw or benchsaw, hand tools
- Wood: 1 afzelia parquet board, 1 wenge parquet board & 1 maple board 300 x 70 x 10mm; bird's eye maple veneers 600 x 250 x 0.6mm

### Finishing the interior:

- 2 coats of clear shellac, sanded with 320 grit sandpaper
- Fine Scotch-Brite

### Finishing the exterior:

- 3 coats of hard wax oil applied every 6 hours with medium Scotch-Brite
- Polishing with fine Scotch-Brite and wool cloth



**1** The four little exterior boards, planed and with the four ends angled at 5° **2** Cutting the waste in between the dovetails requires a custom-made chisel of a few millimetres width. The chisel is laid on a surface in line with the base of the cuts so that all the waste is cut at the same level **3** Ordinary pencil marks would be impossible to see on the wenge so it's best to use a white pencil. It is also essential to light the working area really well **4** The test to close the joints is performed by hand without too much pressure to avoid breaking the pegs or splitting the little boards

## THE EXTERIOR

The first peculiarity of the box is its external shell with a pyramidal shape; hence the little boards need to be prepared so that they are cut along their width at a 5° angle. Their thickness is different, 6mm for the longest ones and 8mm for the shortest so the dovetail joint looks slender. As these boards are so small, planing can be done with a hand plane if you don't have access to a thicknesser; whichever method you use, the important thing is that the blades need to be very sharp for this type of wood. The dovetail joint on the sloping edges is not more difficult to make than the more common vertical one, you just need to know how to draw it; all the information can be found on the following page which describes this process. The difficulties arise from the scarce visibility of the cut lines marked on the wenge and especially from the small dimensions of the joints. The first obstacle can be

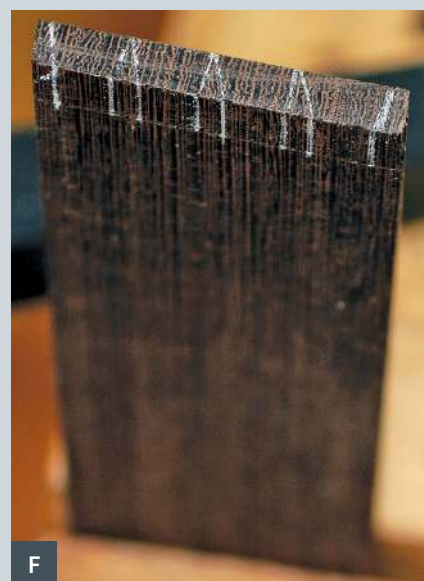
overcome by marking the lines with a white marker and having a good light on the working area, for the second you need to have a chisel of only a few millimetres width with which to cut the bases of the tails; this is not something that is usually available in a workshop. Rather than routing a larger one, you can build one, as I did, starting from a 3mm Allen key.

To achieve good joints, the pegs were cut a bit larger than needed and then finished with a little rasp, after trying to close the joint by hand pressure. Remember to apply a moderate pressure on the same axis and if the joint doesn't seem to close in the right way, reopen it and check where the areas of resistance are, these show as the shiny areas that indicate there's been rubbing between the two parts. Take care as breaking the pegs or splitting the dovetails could happen in a flash.



## HOW TO MARK THE DOVETAIL JOINTS ON TWO ANGLED PIECES

The slope of a tail is usually expressed as a numerical ratio (1:6, 1:8, etc). Let's imagine drawing a right-angle triangle with base 1 and altitude 6, the slope of the tail with ratio 1:6 will equal that of the hypotenuse of the triangle drawn. The angular value is given by the ratio between the legs, so the result remains the same if the ratio doesn't change (1 and 6mm, 1 and 6cm, 2 and 12cm, 3 and 18inches, etc). For this reason, in the following explanation we will not refer to any measurement unit, but we will speak of units and we will use a caliper instead of measuring. This method eliminates any mistakes, makes redundant the use of a goniometer and it will always be applicable for any tail. In the specific case of a joint that needs cutting along two inclined planes, we just need to include the value of the second slope. We start by marking a line on the long sides of the box which starts from the inclined short side and goes parallel to the long ones, setting the false square on the cutting angle of the little board (picture A). The length of this line doesn't matter but identifies the second term for the ratio used to define the inclination of the tails (1:6, 1:7, 1:8, etc). The line has to be divided with the caliper by the number of units chosen for the second entity. On the last point you draw a line parallel to the end of the small board and you centre the caliper again (with the same opening) to draw the intersections with the parallel line just drawn. The two points just found need to be connected with the origin of the first line to form two oblique sides of the triangle that can be seen (picture B). The false square must be set over these oblique sides with which you will mark the sides of the tails. As it's easily understood, if the ratio was 1:6 instead of being 1:7, the triangle would have been more flattened and the tail more tapered. It is then better to try and find the more suitable ratio to obtain a look appropriate to the joint and to the thickness of the wood. Now we have to mark on the end grain of the little board where the tails will be and then mark the lines for the cut with the false square set with the same angle with which the little boards have been cut (in our case 85° – picture C). These lines are to be redrawn as usual on both sides of the little board, setting, as previously said, the false square to copy the oblique sides of the triangle (pictures D and E). Once the tails are cut and their footprint is transferred to the short sides, to mark the face you can draw parallel to the edges (picture F).

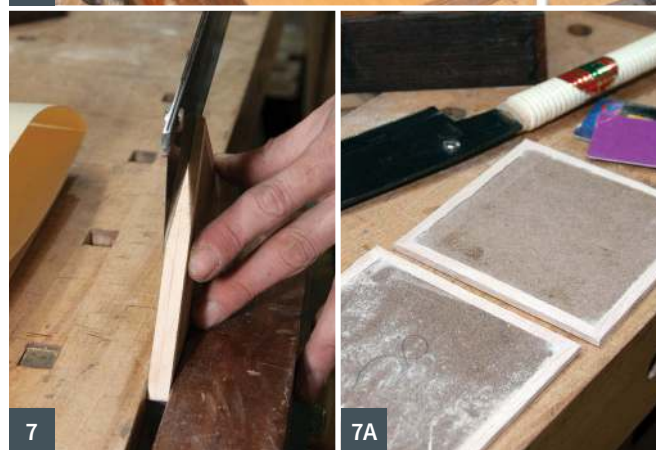




Once you've finished with cutting the dovetail joints, it's time to work on the four little boards. Considering the slope that determines the truncated-cone shape of the box, it is necessary to interpose some angled packs between the box and the clamps. Since you have to cut them, you may as well groove the surface in contact



**5** If there are still some gaps between the dovetails and the pegs, insert some glue in-between with a small layer of the same wood used for the pegs. The hand grain will give an invisible patch **6** The four spacers, shaped to offset the slopes and to follow the shape of the dovetails, ensure a bonding without defects in the joints **7** First two, then one and two again: the two halves of MDF are placed on top of each other with some plastic spacers in between and then edged with solid maple. The sandwich is then divided into halves with a thin saw blade, starting from the four corners that will be connected with the cut to separate the two halves of the lid



## MAKING THE LID

As with all good sewing boxes, this one will have the lid split in two, but instead of being fitted with unattractive hinges, the two halves will have the pins in the middle of the box, which will allow them to open like a seagull wing. To obtain a slim lid that will stay flat and stable over time, as it will be built in the box, the lid will be veneered with a 4mm MDF board. Instead of edging the laminate at the end, with all the consequences (reduced thickness of the lid and MDF board and

no chance to rectify later), I preferred to edge the MDF with a solid maple edging before veneering.

But even in this case applying a 4mm solid edging is not a practical solution, so I chose to overlap the two halves inserting some plastic spacers of 3mm thickness and then edging with a single thick edge. Once the glue had dried, I used a thin blade saw to split the two halves.





**8** Planing the solid maple edge and the result of the planing, making the lids a bit higher than the edges of the box **9** Veneering the two sides of the lid followed the same concept developed for the edging; in this case the veneers were left whole and the lids kept apart by a spacer in between the edges. At the end of the bonding the two lids will be split with a saw for the last time **10** The dimensions of the internal boards leave a rebate to fix the base and to close the lid flush **11** The mortiser of the internal elements has been made with chisels and a little router plane while to cross-overlap the partitions, the cut has been made by hand saw

After planing the MDF and edging at the same level, I used the same method to veneer the two new halves, placing them one next to the other with a spacer in between. This way the alignment stays with the grain meaning the result will look perfect.

## THE INTERIOR

The inside of the box is characterised by a shell and a partition made from maple to make it bright and give uniformity to the bottom of the box itself. After measuring the lower gap, I cut the four little boards of the interior with the same angle as the external one, taking into account the overlap of the elements in the corners.

Due to the truncated-cone shape of the box, the dimensions of the internal boards have to be precise and must leave a 5mm rebate above and below to fit the lid and the base.

The internal partition is made by two horizontal elements cross-overlapping each other. Their endings will be inserted in four mortises hollowed out from the internal boards. Due to the thinness of the elements it is necessary to work very precisely and gently with the saw, the chisels and, if possible, with a small router plane to level the bottom of the mortiser





**12** To plane all the elements, I used a piece of wood as a guide and a small plane. In this picture you can see the adjustments made to insert the lids into the box with minimum gap **13** The box placed vertically thanks to the sloping base has been drilled with the pillar drill to insert the pins for the lid **14** After the holes are completed and the edges of the two touching lids are rounded, you can obtain a fluid and functional opening. The aluminium rivets used for the hinges are left longer than the length of the holes to be able to pull the lids out

## FITTING THE LIDS

After planing the lids to insert them with minimum gap inside the box and after checking that the rebate of the internal shell was dimensionally correct, I found a way to hinge them to the structure.

I opted for the easiest solution, which was two aluminium pins in a higher position so that the internal encumbrance, when opening the lids, would be minimal. Drilling the 5mm thick lids to place the 2.5mm diameter pins is not an easy job; the pillar drill needs to be perfectly set in order to compensate for the slope of the box, as the drilling will be performed simultaneously on the box and lids. Unfortunately, even if the pillar drill had the reclining bench,

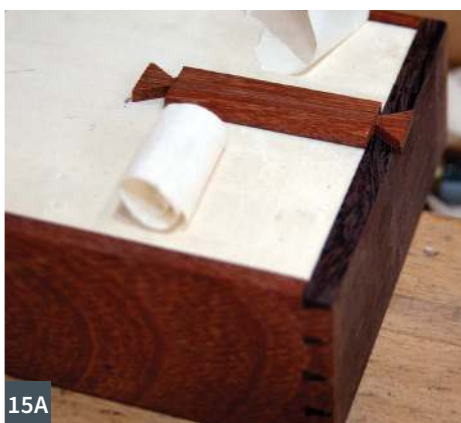
I could not use it because the box was longer than the tip/column distance. Instead I had to work on the other direction, placing the box on a sloping base. With fingers crossed, I drilled and everything was fine.

Once the dowels are fitted, leaving them longer than the length of the hole, it was just a matter of rounding the edges of the lids touching each other to allow the opening. To do that I used sandpaper wrapped around a piece of wood, sanding the edges a little at a time until the opening movement worked perfectly.





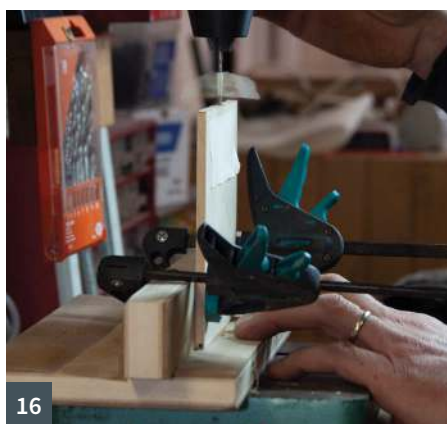
15



15A



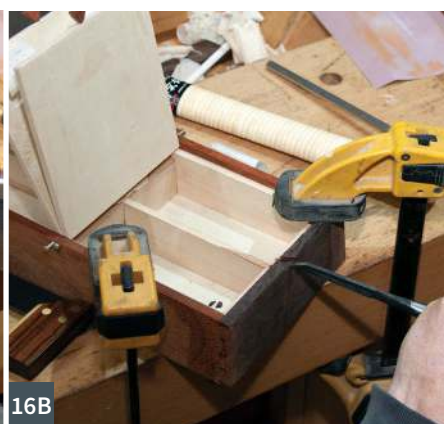
15B



16



16A



16B

**15** The little handles cut, the presentation and the turning of the stem  
**16** The drilling to insert the handles and making the cut on the sides of the box  
**17** The two cut rivets were bonded in the section of the box with a CA glue before putting them into place. Then they were cut flush with a file and the little imperfections (which can be noticed in the picture) were eliminated by sanding the long sides of the box

## THE SMALL HANDLES

The linear design of the box meant that any raised elements would be out of place, such as two little knobs on top of the lids. Plus, the two lids could not have been opened unless the knobs were fixed misaligned. So I opted for two handles on the sides of the box in order for them to overhang a little bit to allow grip. I used a little piece of doussié and shaped it as the dovetail. The only thing to do now was to round the stems of the two handles to be able to insert them into the holes on the lids. This job can be easily done with a little knife, as can be seen in the pictures.

To drill the two lids, I used the pillar drill again, but this time equipped with a square to keep them perfectly vertical. After fitting the handles and refitting the lids, I marked the shape on the sides of the box and cut the grooves. This is an easy job, with a saw you cut the sloping sides of the box and with the chisel you can clean the cut to the same depth of the thickness of the handles.

## FINISHING TOUCHES

For the finishing of the box, I chose oil for the exterior, which goes perfectly with tropical woods left with open pore, and used one with wax to keep the interior odour-free. The oil finishing of the long sides



17

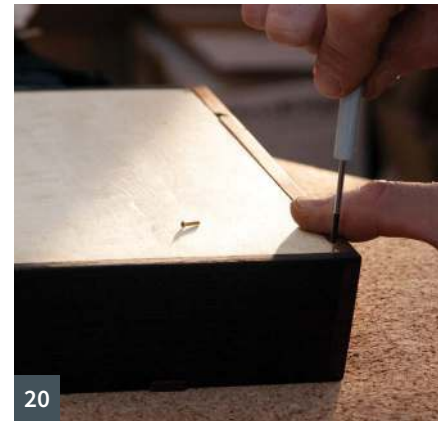


17A

of the box was done to allow the box to be touched without leaving any marks and to minimise the imperfection that could have been caused with the flushed finishing of the hinges' pins.

I marked where to cut the rivets, then cut them and then made them flush with the box, using a fine file with parallel teeth and then a 240-grit sandpaper for metal. Doing this will inevitably damage the finishing and the wood around the pins, so at the end it was necessary to re-sand the long sides and re-apply two coats of oil.

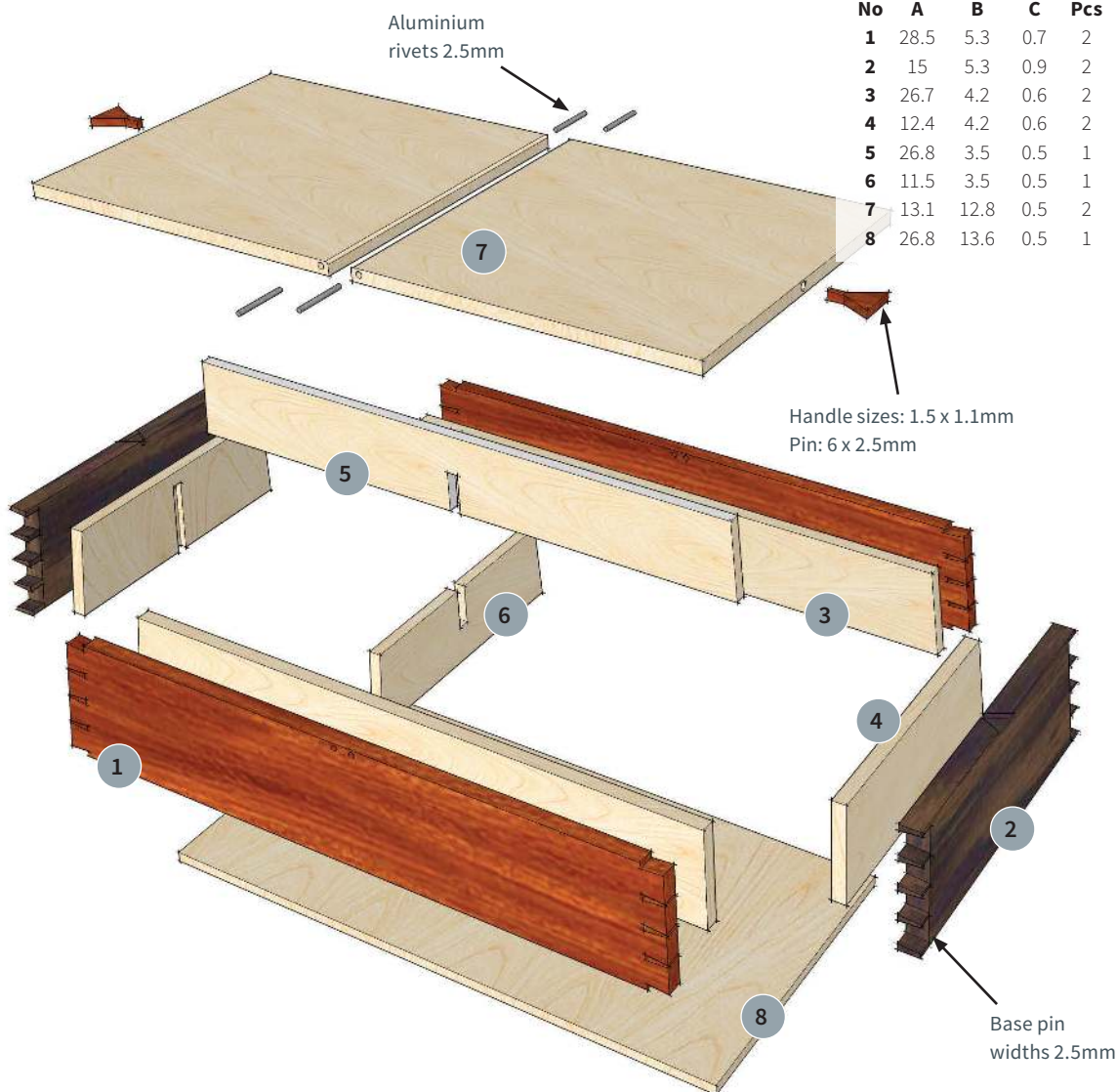




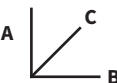
**18** Sanding the long sides of the box after flushing the aluminium pins **19** The last oil finishing on the long sides **20** Fitting the base with four micro screws was followed by applying four rubber dots on top of the screws, which will allow the box to stay a little bit raised

Now it was just a matter of fitting the inside shell and the base. Placing the box on the lids, I could insert the internal shells with a drop of glue, checking that they lean flush, and then those of the internal partition. For the base I chose a fixing system with four brass-plated micro screws, because the brass ones are difficult to find, let alone with those reduced thickness.

The box took four days to complete, which, if you look at the economic side, makes these objects non-commercial and non-marketable (unless you work under commission). But my suggestion is to try to create these types of projects anyway because they ignite the passion of the maker and of the person who receives it as a gift.



| No | A    | B    | C   | Pcs | Elements description   |
|----|------|------|-----|-----|------------------------|
| 1  | 28.5 | 5.3  | 0.7 | 2   | Long exterior side     |
| 2  | 15   | 5.3  | 0.9 | 2   | Short exterior side    |
| 3  | 26.7 | 4.2  | 0.6 | 2   | Long interior side     |
| 4  | 12.4 | 4.2  | 0.6 | 2   | Short interior side    |
| 5  | 26.8 | 3.5  | 0.5 | 1   | Internal long divider  |
| 6  | 11.5 | 3.5  | 0.5 | 1   | Internal short divider |
| 7  | 13.1 | 12.8 | 0.5 | 2   | Lids                   |
| 8  | 26.8 | 13.6 | 0.5 | 1   | Base                   |

A  C  
B  
Measurements in cm



# The king of tools: THE HAMMER

Some may consider it as a mere piece of iron stuck on the end of a stick, but here are 10 reasons why we shouldn't underestimate this basic, yet essential tool

---

## 1 It is one of the oldest known human artefacts

The recent discovery of a collection of stone tools in Kenya dating back to 3.3 million years ago proved that our ancient ancestors were using them for hammering and breaking food.

## 2 It is used in many professions

Fast-forward a few ages and the hammer has evolved to fill a wider variety of roles, being used by carpenters but also bankers, barristers, cobblers, musicians, pathologists, geologists, jewellers – and let's not forget cheese testers among so many others.

## 3 Leonardo da Vinci re-invented it

The Cam Hammer designed at the end of the 15th century was a mechanical invention ahead of its time. The concept that transforms circular motion into oscillating motion would be used for repetitive tasks centuries later, notably during the Industrial Revolution.

## 4 It comes in many shapes and sizes

The world's tiniest hammer, also called the  $\mu$ Hammer or microHammer, was built in 2017 by scientists at the University of California to see what happens when force is applied to brain cells.

## 5 It can break the 'unbreakable'

The word 'diamond' may derive from the Greek meaning 'indestructible', being one of the hardest natural substances known to man... and yet, against all odds, it can be broken by a hammer if hit at the right angle.

## 6 More than a tool, it symbolises power and strength

In mythology, it is often used by the gods to represent destruction, protection or immortality. One of the most fearsome and powerful weapons is Mjölnir, the hammer of Thor, the Norse god of thunder, which could level mountains.

## 7 Once upon a hammer in Hollywood...

Hollywood's master swordsmith Tony Swatton forged the closest thing to Mjölnir on Earth: an 11-inch long, 5-inch high and 4-inch wide hammer that weighs 20 pounds when hollow – and up to about 200 pounds once filled. Still rather difficult for mere mortals to pick up though.



## 8 It is one of the oldest sports in history

If forms of hammer throw were in fact practised at religious festivals honouring Thor, the sport dates back to the Tailteann Games held in Ireland as far back as about 2000 BC, where a chariot wheel was thrown for the farthest distance.

## 9 It was a civil rights hymn

Originally written in 1949, 'If I had a hammer' became a freedom song of the American civil rights movement, when it was performed prior to the 'I Have a Dream' speech by Dr Martin Luther King, Jr at the March on Washington in 1963.

## 10 There's a museum devoted to it

The Hammer Museum in Haines, Alaska in the US, is dedicated to preserving the history of the hammer with more than 2,000 on display. The eclectic collection is, literally, out-of-this-world, and includes Masonic lodge hammers, warhammers from China, an Egyptian dolerite ball... and even an outer space hammer used on the International Space Station.

PHOTOGRAPH BY ANTHONY BAILEY



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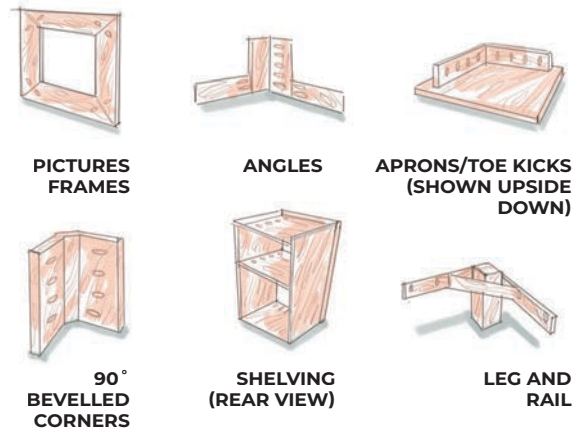
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| <br><b>T2 PHJ</b><br>Double Mini Pocket-Hole Jig           | Small scale projects with <b>1 to 20</b> Pocket Holes<br>               | <br>Required |
| <br><b>T2 PHJS</b><br>Double Mini Pocket-Hole Jig Set 8pce | Small scale projects with <b>1 to 20</b> Pocket Holes<br>               | <br>Required |
| <br><b>T3 PHJ</b><br>T3 Handy Pocket-Hole Jig 3/4" (19mm)  | Small to large 3/4" projects only, with <b>1 to 50</b> Pocket Holes<br> | Handheld                                                                                        |
| <br><b>T4 PHJ</b><br>T4 Easy-Set Pocket-Hole Jig           | Medium to large scale projects with <b>1 to 50</b> Pocket Holes<br>     | <br>Built in |
| <br><b>T6 PHJ</b><br>T6 Pocket-Hole Jig                    | Medium to large scale projects with <b>50+</b> Pocket Holes<br>         | <br>Built In |
| <br><b>T6 PHJM</b><br>T6 Pocket-Hole Jig Master Set 12pce  | Medium to large scale projects with <b>50+</b> Pocket Holes<br>         | <br>Built In |
| <br><b>TW 7PHJ</b><br>Clamping Pocket-Hole Jig 7pce        | Small to large scale projects with <b>1 to 50</b> Pocket Holes<br>      | <br>Built In |
| <br><b>TW 8CPHJ</b><br>Clamping Pocket-Hole Jig 8pce       | Small to large scale projects with <b>1 to 50</b> Pocket Holes<br>      | <br>Built In |

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