AUSTRALIAN
# Wood
REVIEW
87



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## READING THE GRAIN
How to Avoid Tearout

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- SHAPED AND SAWN BOX
- HEIRLOOM TURNED STOOL
- FRAME & PANEL BY HAND

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Getting Started

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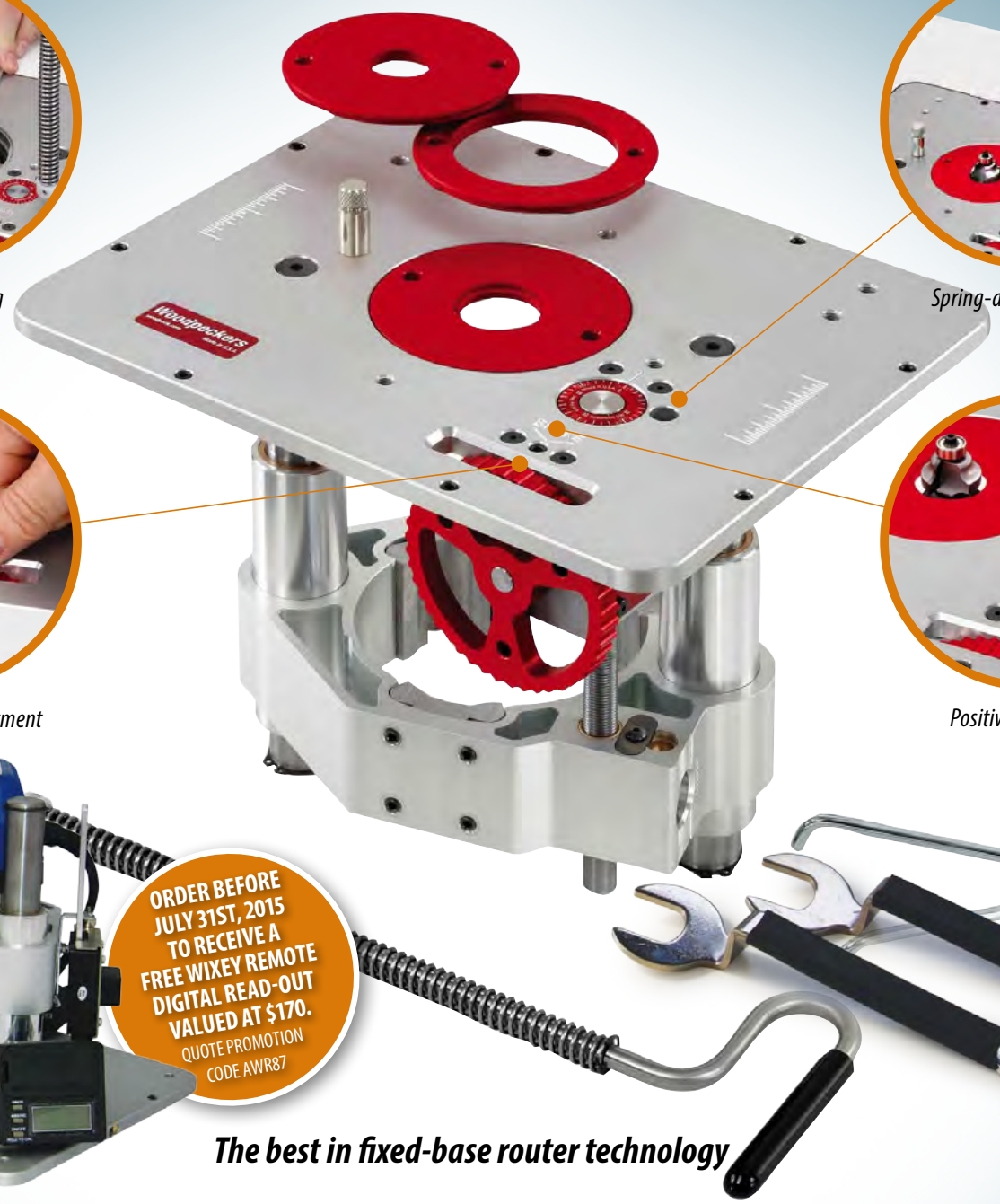



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AUSTRALIAN Wood REVIEW 87

# Contents

ISSUE 87 – JUNE 2015


## TIMBER



## PROFILE



## FEATURES



## WOODTURNING



## PROJECTS



## FINISHING



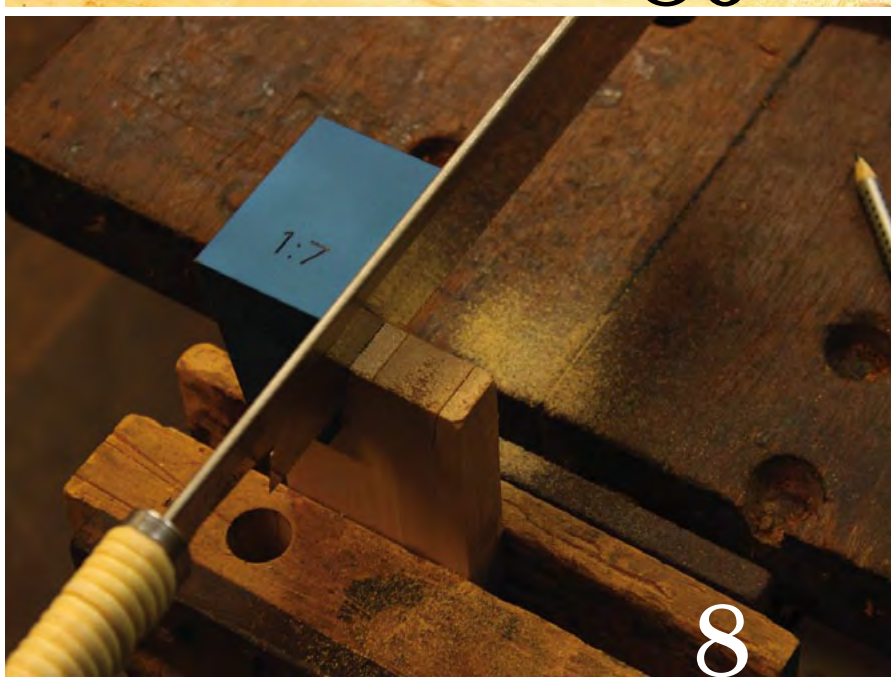
## TECHNIQUES



## REGULARS








## TOOLS & EQUIPMENT

# Editor's Letter

## Finish well

In a relay the one last in line is often chosen for their ability to sprint home and secure a win. But often, with woodwork, what happens last, ie the finishing, ends up losing the race.

To watch Frank van Brunschot stretch, straighten and pull out of seemingly nowhere a deeply polished surface on wood is magical, you'd think it was alive. And all this with a substance that derives from an insect and some common old metho squeezed into a clump of rag and wadding. That's what you call a craft and it's laced up with science and a good deal of zen as well. Frank is on the cover this issue and in his article he's trying to tell you that even though it might be the pinnacle of the wood finisher's art, learning how to French polishing is achievable.

## Why we collect

When we invited readers to send in some info about their collections I wasn't sure what to expect. Well, that was before I heard about Vince Manna's 9,000 timber samples and the literally thousands of handplanes, hand tools, machines, books and other items that our featured collectors possess. For them there is a deep respect for the traditions and skills these things represent. And some people just don't do things by halves. Turn to p.58 to find out more.

## Erasmus Shadow cabinet

Believe it or not the process of building the cabinet that master craftsman Neil Erasmus shows you how to make this issue is one he has streamlined for production. It's a sleek looking piece inspired by mid-century modern design and part of a series he is developing. Not only is Neil sharing his design and techniques he's giving us some insight into the methodologies of a world class studio furniture maker.

## The trouble with wood

The things we love about wood, its beautiful grain, figure and the way two pieces are never quite the same, are ironically the things that can make it hard to work. Two stories this issue may help. Robert Howard discusses wood grain (as opposed to figure) and how understanding it can help you avoid tearout. Charles Mak also offers advice in the same vein with his tips on machine planing wood.

## Your feedback

Up until June 30 we're inviting you to give us some feedback on the magazine. The survey is online, just go to our home page and you'll see a button you can click on. Letting us know what you think helps us to deliver the sort of content you want and we really would appreciate your input. See p.26 for more information.

## Student Awards

They're back for 2015! Wood Review's Student Awards were launched last year and got a great response from readers, not to mention family and friends of the students that entered. Entries are due by December 15 and details and entry forms are on our website. Please spread the word.

## Online news

With fortnightly eNewsletters we now are able to give you much more timely information about events and news, simply sign up at www.woodreview.com.au to stay in touch with what's happening. And of course you are invited to send us your news.

**Linda Nathan, Editor**
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**COVER:**
Frank van Brunschot, craftsman and furniture restorer

**COVER PHOTOGRAPHY:**
Linda Nathan

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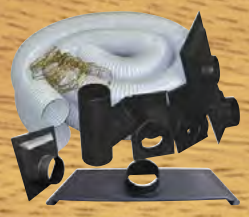

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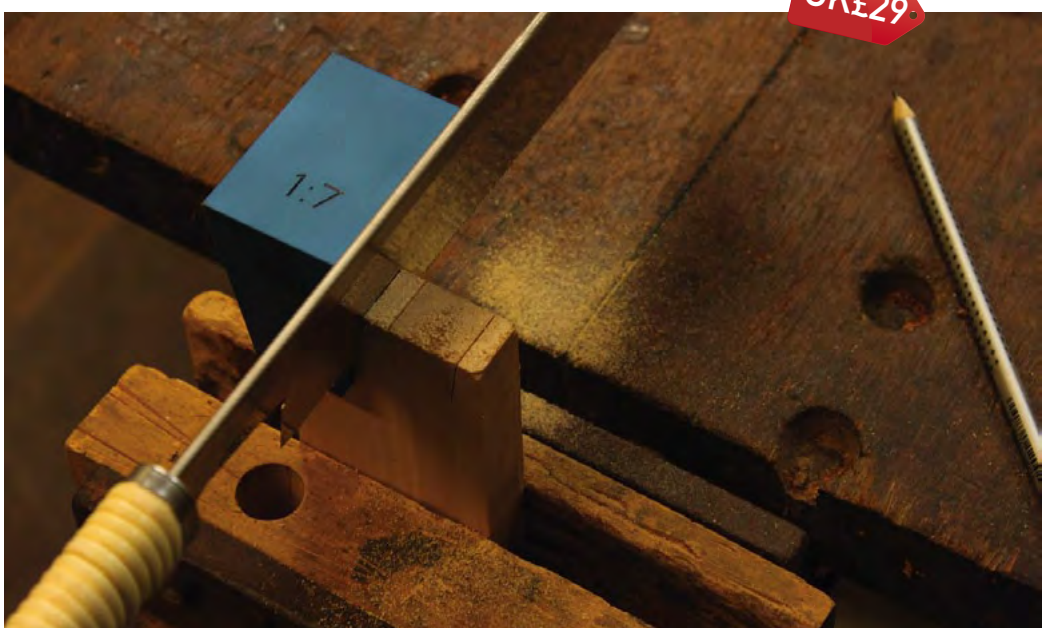
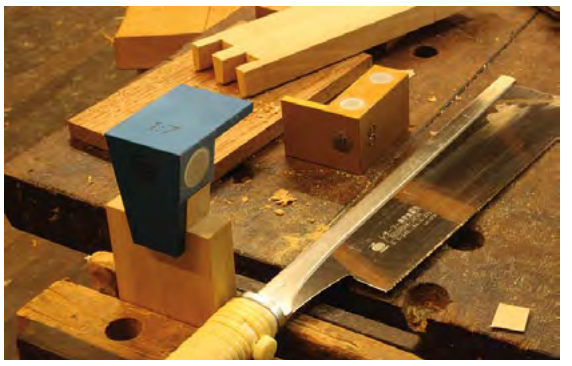
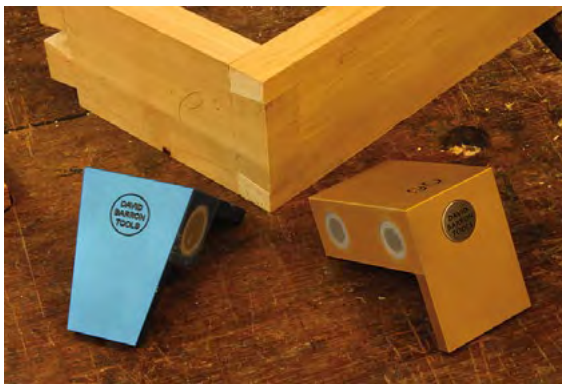
# **David Barron** Dovetail Jigs

*Reviewed by Raf Nathan*





British woodworker David Barron has an interesting website featuring his furniture and boxes but what caught my eye were some dovetail jigs of his own design. Apparently he started making wooden versions of these but now has them made in the UK from anodised aluminium in a variety of dovetail angles.

The aluminium is thick (6mm and thicker in some parts) and the machining is excellent. They are a high quality product. The samples I received were a 1:7 dovetail plus a 90° jig for straight sawing. They have embedded magnets to secure a handsaw at the desired angle and a special film coating that reduces friction between saw and jig.

There is no mistaking the similarity to the Veritas dovetail guides which I have been happily using for many years. Unlike the Veritas guides however these have no clamp to secure them, rather they have abrasive paper glued in place. In use you sit them in position and the abrasive counteracts any movement. Without a clamp to tighten and set, the Barron jigs are fast to use, and whereas the Veritas jig can sometimes foul the saw, these keep the sawblade well clear of the aluminium. Rest the jig on the piece of wood to be cut and the strong magnet guides the saw at the desired angle.

Despite the aid in sawing, ultimately a dovetail you make depends on where you place the saw cuts. For example saw the tails first and there are no dramas. But the next step of transferring the tail positions is up to you. Practice and good reading glasses are needed to place the remaining saw cuts. It's still all about accurate marking and chiselling once all the sawing is complete but the Barron jigs do remove the sawing headaches.

My samples arrived with a recommended Japanese fine saw which worked brilliantly. I also tried various other saws, both Japanese and Western style, and still achieved good results. Using the 1:7 dovetail and 90° jig enabled me to easily saw tight dovetails. In fact after one practice set the second set were very satisfactory. These jigs are highly recommended.

*Tools supplied from www.davidbarronfurniture.co.uk*

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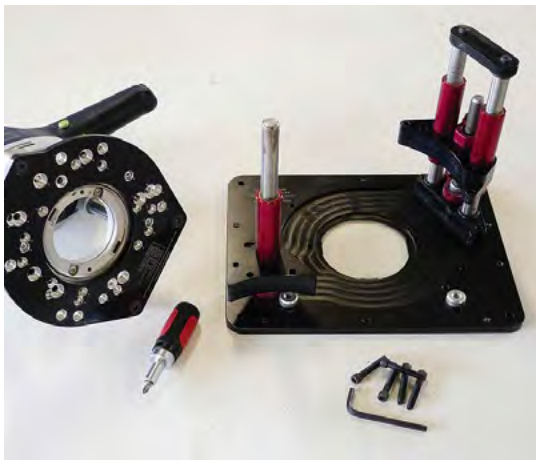
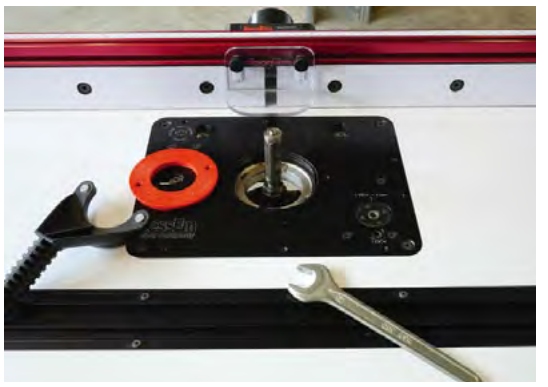
# **JessEm** Router Prestige Package

*Reviewed by Nathan Day*



Last year, in AWR's Boxmaker competition I was fortunate enough to win the Jessem Deluxe Router Table package. In my workshop I have two spindle moulders, each with high speed router spindles, but not a stand alone router table. Despite this I still saw it as a great prize and a welcome addition to my workshop. The package includes a router lift, stand, phenolic top, fence and featherboards.

A router table needs a dedicated router. For this review, I fitted my Festool OF1400, which is listed as compatible with the lift mechanism.

The Jessem is a good looking unit. It arrives flat packed but bolting it together is straightforward. The quality of the base and in particular the powder-coating is reflective of the high quality of the overall package.

The main tabletop is laminated phenolic. Not too dissimilar in appearance to compact laminate with its black core and clean white surfaces. Jessem claim it will not sag at all, but I did find about 0.3mm of sag across the length, not too bad considering how much weight is actually hanging off the middle of the table.

Fitting the Festool was very easy. Pre-drilled holes in the plate correspond to those in the base of the router. Grub screws, spaced out around the edge of the plate, allow you to perfectly align the surface of the router plate with the surface of the tabletop.

The fence requires a small amount of set-up, with channels attached to each side of the table providing forward and back adjustment. Wing nuts open and close the mouth according to the size of cutter you are using. Fence adjustments are great, very positive without any need to overtighten.

One of the main advantages of a good quality router lift such as this is that all adjustments happen above the table. Rise and fall is via a key, made very accurate by a graduated scale. Removing the plastic table ring allows good access for changing bits.

The supplied featherboards look quite clunky and very plastic, but they are actually a clever design, both in the way they fit into the channels in the table and the fence, and also in the way they can be alternated. I even used them upside-down as a stronger hold-down. Locking and adjustments here are again easy and positive.

Dust extraction is via a fitting in the back of the fence which I attached to a small vac. A little bit of dust escaped through the bottom of the router, but the table was generally quite clean, especially when the clear, bit cover was fitted and set.

The only real drawback is the table is quite small. I notice this coming off spindle moulders which have a much larger work surface. I had a problem routing some coffee table frames as there was not enough support. Apart from that I would say that this set-up gets a big thumbs up.

Overall, I was very impressed with the Jessem package. The finish on all the parts was great, and once set up, allows for quick start up and change over between functions. A valuable piece of equipment for a professional workshop and a very good looking router table.

*Supplied by Gregory Machinery: www.gregmach.com.au, (07) 3375 5100.*

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Standard cutter head | *Shelix* cutter head

**See the difference:**
The pictures show Red Gum planed with both standard knives and Shelix cutters. Note the absolute minimal tear-out with the Shelix cutters in this very difficult to plane timber.

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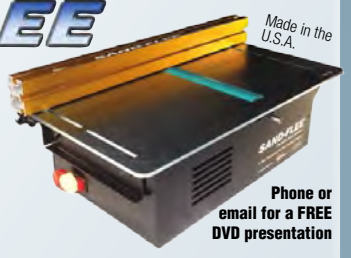


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# **Vicmarc** Grinding System

*Reviewed by Terry Martin*

$269

**Above:** Vicmarc grinding system. Shaping the tool on the coarse wheel.

Grinder $269, CNB wheels $230 each, sharpening jig $160, grinding rest $168

Conventional grinders are outdated technology with many disadvantages: the tempering of tools is easily destroyed by overheating, the abrasive debris can damage your lungs, the wheels require constant dressing and, most alarmingly, the wheels can disintegrate with deadly results. I am a recent convert to wet grinding which has none of the above problems, but it is slow, which is a major drawback, particularly for shaping of tools.

The arrival of carbon boron nitride (CBN) wheels has solved this problem. I don't need to understand the chemistry of CBN to know that it passes every test I can throw at it. No overheating, no debris, always runs true, and sharpens far better than conventional grinders. Until now the main way to switch to CBN in Australia was to order the wheels and fit them on your existing grinder. But now Vicmarc Machinery has produced its own CBN grinding system and it works wonderfully.

The 1500 watt grinder runs at a slow 1500rpm, which means less heating. The wheels are a hefty 200 x 40 mm. Set-up is simple if you follow the handbook. Two slide assemblies are attached to the bench either side of the grinder for accurate positioning of the grinding accessories. The Grinding Rest is similar to traditional rests, but it can be quickly adjusted with repeatable accuracy for many operations. The Quick Tool Setter makes setting the most popular angles easy. The Sharpening Jig is a swinging arm for simple shaping and sharpening of the kind of complex bevels that give many woodworkers nightmares. It is a robust device that accommodates many tools that can't be sharpened in some other jigs, such as shorter tools.

The left wheel is a coarser 80 grit, suitable for shaping, while the right wheel is fine enough at 180 grit to give a silky finish. While the system will particularly appeal to woodturners, other tools, knives and scissors can be sharpened on this system. The abrasive also wraps 40mm around the side of the wheels so you have a flat surface for special grinding jobs. My workshop is now cleaner and my old grinders have been put out to pasture. This system will save me money and time as tools will last longer and cut more efficiently.

*Available from Vicmarc Machinery (07) 3284 3103, www.vicmarc.com*

# **Excalibur** Magic Gripper Pro Gravity Clamps

*Reviewed by Linda Nathan*



$150 per pair

Sometimes not just an extra pair hands but also feet come in handy in the workshop. These door or panel clamps will work for you in various ways.

They work 'automatically', meaning the weight of the material inserted locks the spring-loaded mechanism. Panels and boards from 15mm to 55mm thick can be inserted up to a weight of 100kg and no screwing, locking or tools are required. Lift the panel and without weight the clamp simply opens. Adjusting for width of material is via thumbscrews and a thumbwheel on the base.

If you're fitting hinges on a door or working on a panel, these clamps are a very convenient and secure way of standing things up. Supplied in packs of two we found them very handy for standing up a large benchtop to free up space for other work to continue. As floor stands these clamps are a great asset.

For onsite work they can be even more useful, and not just for workholding. Two of these clamps plus three pieces of board can equal a portable workstation that will provide enough stability for most hand and powered operations. You could also use them to create an instant screen or display.

Made from very hard polystyrene, the clamps are also provisioned for fitting of wheels or pads and also rods for securing two clamps in workstation mode for even more functionality.

*Review clamps supplied by Excalibur Tools, (02) 9624 7200, www.excaliburtools.com*

FEAST WATSON

# The best effects are achieved by hand.

Mastertouch Wipe-on Poly is an oil based polyurethane that is applied by cloth to give a silky smooth clear finish comparable with hand rubbed finishes. It's easier to apply than traditional oil varnishes which require proper technique and patience to avoid leaving brush marks and runs in the dry film.

Wipe-on Poly is a versatile interior clear finish for new or pre-finished wood. Available in a Gloss or Satin, it is ideal for fine woodwork including contoured or profiled surfaces and turned work.

Wiping on with a cloth results in thinner coats than using a brush and the recoat time is shorter. For surfaces like table tops which are exposed to more wear and tear, the better option is Feast Watson Clear Varnish. The higher film build will result in better resistance to abrasion and contact with liquids.


To achieve a silky smooth finish, bare timber should be progressively sanded finishing with 240 grit or finer. Sand in the direction of the grain. View under good light to ensure there are no visible scratch marks or defects in the surface.

> "Wipe-on Poly is a versatile interior clear finish"

Remove all dust.

If desired, the wood may be stained with Feast Watson Prooftint Traditional Stain. The stain may be mixed with some of the clear Wipe-on Poly to reduce the colour strength. Always test the colour on a timber off-cut first.

Apply Wipe-on Poly with a soft lint free cloth, folded into the shape of a pad. Wipe in any direction, but finish with long straight strokes in the direction of the grain. Let each coat dry for at least 6 hours. A light sand can be undertaken between coats, being careful not to sand through at the edges. You may build up to four or five coats to achieve better protection. A higher gloss level is achieved with more coats.

Gloss accentuates the grain but will also highlight any underlying imperfections in the surface. Satin gives a softer appearance.

Wipe-on Poly can be used over previously varnished surfaces such as furniture and interior panelling. The surface preparation required will depend on the condition of the surface. Follow the advice on the label directions.

Whether it's one or two coats to renew the appearance of the original finish, or multiple coats to build up a hardwearing surface, Wipe-on Poly allows you to achieve a customised, classic finish - all by hand.

For further information about Wipe-on Poly, or any other Feast Watson products and their application, visit www.feastwatson.com.au

ENRICHING AUSTRALIAN TIMBER
SINCE 1922


# **Bosch** GAS 50 Professional Workshop Vac

*Reviewed by Andrew Potocnik*

To call this a workshop vacuum cleaner is an understatement, really it's a vacuum on steroids, ready and able to keep any workshop clean and dust free, whether used to keep your benches and floor spotless, or attached to benchtop machinery to suck away sawdust or shavings as you work.

To test this product I treated it as if it was something I'd bought to use in my own workshop, so I didn't hold back. With a motor rated at 1200 watts and a 50 litre capacity bin (according to specs on the box), it worked well beyond expectations.

The 35mm diameter hose couples with a variety of attachments that enable use as a household-type floor cleaner on a variety of surfaces and at three metres long, you're afforded generous freedom to attach it to various machines without moving the vacuum itself.

The five metre long electrical lead is a welcome extra when moving the vac around the workshop. Fitted with lockable pivoting wheels the unit is easy to manoeuvre, or simply locate just where you need it. And at 16 kg, it's easy enough to lift, even into a vehicle for transporting to another worksite.

Testing it further, I used it as a dust extractor fitted to a random orbital sander, then a tablesaw, where it again performed beyond expectations. Soon I found myself cleaning dust from all surfaces of machinery, and then around the workshop. The more I used the GAS 50, the more applications I found it could fulfill.

Apart from its excellent suction, it allows you to get into tight spots and remove dust that in my case has been building up for years. Dust, chainsaw shavings and coarse turning shavings were sucked away without a problem. My workshop has never been this clean...and may never be again!

Features that are now becoming standard on machines of this kind include remote auto switching, meaning you can plug power tools into the machine and it will spring into action as soon as you fire up the power tool – a real dust and timesaver. Then there's a 'shaker option' which will clean the filter out and prolong its ability to provide maximum suction and filtration. The GAS 50 has a stated vacuum capacity of 248mbar, airflow of 61litres/sec and a filter surface of 8.600cm2.

At times I found myself cursing its power as I suspect there are a couple of lightweight items that are now missing from my bench and possibly inside the GAS, which in a way is a good problem. There could be nothing worse than a suction unit that underperforms and leaves residue behind.

With increasing awareness of health risks associated with inhalation of fine wood dust, this vacuum is not only an asset that helps keep your workshop tidy, but if combined with good dust extraction will help maintain a safe working environment.

All in all, it's a small scale portable dust extractor perfect for attaching to power tools for day-to-day use, or cleaning up the workshop at the end of the day to reduce harmful dust build-up.

*Review machine supplied by Bosch Australia*

# **Striplox** Pro 55 Fittings

*Reviewed by Raf Nathan*

This Australian made product is a clever concealed mounting fitting. The fitting consists of two reinforced nylon parts, male and female. One part fixes to the rear of say a cabinet. The second part fixes to a wall. The two parts then push together and slide across about 12mm to securely mesh together. The resultant bond is strong and rated up to 200kg capacity for downward resistance.

Striplox parts can be fully or partially recessed into cabinetry that needs to be mounted. Mounting is with 8-gauge screws, although the instructions also say a proprietry Striplox instant adhesive is also available.

I mounted a small tool cabinet on the wall easily. One Striplox fitting was


recessed 12.5mm into the rear of the cabinet whilst the mating part was screwed directly to the wall. The cabinet was lifted up onto the wall fitting pushed in and then slid across to lock it in place. The beauty is that by merely pushing firmly sideways the cabinet can be removed as easily as it mounts. I found the Striplox fittings fast and easy to use whilst offering a very strong concealed fixing.

*Supply details from*
*www.joinlox.com/striplox*

**Left:** The Striplox fitting consists of two mating parts.

One part is screwed into the back of the piece to be mounted, the other into the wall.

**Above:** Locate the fittings then slide the cabinet across to lock the parts for a strong but removeable fitting.

# **Tormek** T4 Water Cooled Sharpening System

*Reviewed by Troy McDonald*

Tormek is known for quality and the new T4 keeps that tradition alive. The improvement over the T3 is that all critical components are now housed in a cast zinc head assembly so that the rigidity of the T4 now approaches that of the much heavier T7. In use, this translates to improved accuracy and capability.

The main difference between the T4 and T7 is really the size of the grinding wheel (200mm and 250mm) and the design of the drive train. The 14.5kg T7, being a professional model, is designed for long life with a heavy 3mm steel body and a 200 watt motor rated for continuous use. At 8kg, the T4 is lighter, and also less powerful, with a 120 watt motor rated for 30 minutes continuous operation per hour. The restricted duty may sound limiting, but in my experience it rarely is in normal use. The T4 also has a significantly smaller leather honing wheel at 145mm diameter compared to the T7's 220mm.

Tormek offer jigs and accessories for sharpening everything from carving gouges to axes. The T4 comes with fewer accessories, meaning users pay only for the jigs they require. Included are the obligatory wet grind stone, leather honing wheel, stone grader, angle master and a fantastic instruction manual/DVD. The stone grader is crucial as it allows the grinding stone performance to be switched between coarse and fine grit.


I tested the T4 with an array of bench chisels, plane irons, kitchen knives and woodturning chisels and it really did perform flawlessly. The reduced power of the T4 in comparison to the T7 is noticeable during heavy grinding of some turning chisels or the initial reshaping of tools, however it's still perfectly functional with heavy grinding taking slightly longer to perform. Once your tools are shaped, the accuracy and repeatability that the Tormek allows means that sharpening is a very quick process.

Unlike the T7, using the square edge jig on the honing wheel is not possible on the T4, however freehand honing is not a difficult skill to master.

**Left:** The stone grader easily converts the grindstone from coarse 220 to fine 1000 grit.

**Above:** Hand held stropping with the leather wheel leaves a razor sharp edge.

Once you factor in the cost of additional accessories, it does equate to a significant investment. However, the repeatability and versatility of the system is what I love about the Tormek. If your sharpening needs extend beyond the basic edge tools to include turning or carving chisels then the T4, in my opinion, presents one of the quickest routes to successful and repeatable sharpening.

*Review tool supplied by Carbatec, www.carbatec.com.au*
*More info at www.promac.com.au*

# High precision
## for a professional finish

### Bosch Bench Drill PBD 40

**Single Control**

Start and emergency stop in a single, compact control dial


**Digital display**

Precise positioning drill depth (in mm) and speed (in rpm)

**Laser**

Accurate and precise drilling

**Constant Electronic**

For optimal speed regulation, and maintaining speed under load


**Depth Stop**

For fast repetition of same depth drilling


**2 gears**

Simple control of power and speed without belt change

**LED**

Perfect illumination of the work surface

**Chuck**

Full metal 13mm chuck for accurate drilling with chuck guard for safe working

**Adjustable clamp**

Even round workpieces can be easily attached

**Aluminium plate**

For optimal stability

Voted by Australians Winner TRUSTED BRAND 2014 Reader's Digest DIY Power Tools

Available at BUNNINGS warehouse

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Find out more **www.bosch-do-it.com.au**

RB3682PB KRD 4/15

Clear-Cut guide mounts to top of tablesaw fence.

## **JessEm** Clear-Cut Stock Guides

*Reviewed by Raf Nathan*

Kickback. This is what you get when a piece of wood being machined is flung back from a sawblade or a router bit. Considering the speed of a circular sawblade, anything flung from it can be at very high speed and incredibly dangerous to anyone in the line of fire. Hence rule one can be to always stand out of this firing line when working at a machine. Rule two could be to consider making or purchasing safety equipment like these JessEm Stock Guides which are designed to avoid kickback.

When I look at equipment like this I understand where America's edge comes from in manufacturing military equipment. This is a superbly made piece of aluminium and steel kit.

A long aluminium track is first fitted to the top edge of your tablesaw. This has predrilled holes for screw fixing, or use the included fittings to fit into standard 1/4" T-track. Set this track 20mm back from the fence edge and the guides can be raised and pushed out of the way when not needed. On my saw fence I was able to secure the track into the existing slots.

There are two heavy aluminium stock guides that can be positioned along the track. Thumbscrews lock these in place. Steel rods extend from the bodies and support length adjustable arms that house the anti-kickback rollers. The assembly is under spring pressure to apply downwards force. The rollers are twin nylon wheels angled at 5° thus steering the wood in towards the fence. The rollers will only turn one way thus preventing kickback.

In use you set the guides in position on the infeed and outfeed of the sawblade, always on the right side of the blade. The adjustable arms need to be set at no less than 30° from vertical to work correctly. The height of the rollers in relation to the wood being sawn is quick to set with a thumbscrew. Rest the roller assembly on the wood, that is the part without the nylon wheels that will automatically set the height for the rollers to work.

Pushing the wood forward now engages the nylon wheels that apply pressure towards the fence and totally resist backward movement. The Clear-Cut Stock Guides do as they should, forcing the wood against the fence and resisting any rearwards action. Assuming everything is set up as recommended, kickback is avoided. I found they worked very well for sawing solid wood sections and panels. The force applied is quite strong and certainly they helped with jobs where a lone operator may normally struggle to keep things aligned to the fence. JessEm also make a version of the guides designed for router tables.

*Tool supplied by Gregory Machinery, (07) 3375 5100, www.gregmach.com*

## **Dust Deputy** Deluxe

*Reviewed by Raf Nathan*


The latest Dust Deputy Deluxe release has some small mods over the original model released some years ago. The price though is much the same as it was.

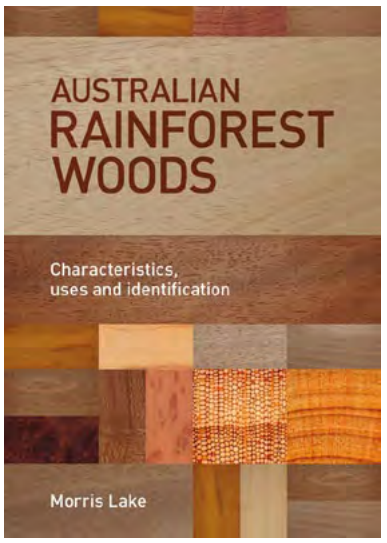
Basically there are two plastic buckets that sit under the special semi-transparent cyclone. One bucket collects the waste whilst the other acts as a cradle for the assembly. The hose from your power tool fits to the top of the cyclone which acts to direct the dust laden air down in a spiral, like a cyclone. Large particles fall down into the bucket while the air is then carried up into the hose exiting to the dust extractor. Separating the larger waste extends the life of your dust extractor bags immensely. Plus the extractor runs more freely with larger breathing capacity.

I had a large routing process that would have almost filled the expensive paper bag in my extractor. The Dust Deputy however collected masses of the waste and appeared to offer more sucking power. I was sold on the spot.

The downside is setting up the assembly. The instructions recommend attaching the supplied wheel kit to the base of one bucket and using a foam spacer to bolt it to the side of your dust extractor housing. However I wasn't comfortable with fixing it to the thin plastic on my extractor. An alternative mounting sits it on top of the extractor which required some shop built brackets and fixings.

Visually the two plastic buckets atop a modern designed dust extractor are not pretty. I appreciate the price of the unit but painting the buckets would help. But with a fair price and excellent performance, in this case function wins over form.

*Tool supplied by www.carbatec.com.au*




**Left:** CSIRO's new title describes 141 rainforest species.

**Above:** Scene from last year's inaugural *Spoonies in the Tweed* event.

**Right:** Under the table view of SawStop's emergency braking safety system.

## Rainforest reference

Australia has more tree species than any other continent in the world and CSIRO has just released a new publication which significantly adds to our knowledge of this remarkable resource. *Australian Rainforest Woods: Characteristics, Uses and Identification,* written by Morris Lake, describes 141 species and their wood. With over 800 images, including macrophotographs by Jean Claude Cerre, this book may be the most comprehensive guide ever written on Australian rainforest woods.

Morris Lake worked as Senior Technical Information Officer in Qld's Department of Primary Industry and has subsequently authored and co-authored over 450 books and publications, as well as editing *World of Wood*, the journal of the International Wood Collectors Society until 2013. See www.woodreview.com.au for a review of this title. To purchase visit: www.publish.csiro.au

## Furniture industry planning

The Australian Furniture Association (AFA) is the industry's peak body and estimates that 200,000 people are employed in the furniture industry supply chain, from designers to manufacturers small and large. Of those, the AFA states in its *Strategic Plan for 2013 to 2018,* that 31,000 people, generally in small firms, are employed in the wood and upholstered furniture industries. The AFA aims 'to promote the profitable growth, competitiveness, innovation, and the export readiness of its members'. Last year the AFA staged the Australian International Furniture Exhibition in Melbourne in 2014 (*see report AWR#84*) and this year will feature the *Australian International Furniture & Design Fair*, July 9–12 at the Royal Exhibition Building, Carlton Gardens, Victoria. The event will include a range of trade and public activities and encompass FURNITEX connect, Australia's longest running exhibition of furniture and furnishings, open to trade only from July 9–10, with public access July 11–12. For more information on related events see www.australianfurniture.org.au

## Safer tablesaws

SawStop tablesaws have been available in Australia through Gabbett Machinery for some time however Carbatec is now also retailing the range throughout Australia and in Auckland, NZ. Four models are currently available in Australia: entry level 1.75hp Contractor, 3hp Professional, and 3 and 5hp Industrial. Interchangeable accessories include crosscut sliding table, overhead blade guard with dust port, mobility kits and throat plate inserts. At the heart of all SawStop saws is the emergency brake, a sophisticated safety system that comes into play if flesh contacts the blade. SawStop saws are available from Carbatec and Gabbett Machinery. See www.carbatec.com.au and gabbett.com

## All aboard

Exciting new developments are afloat for Timber & Working Wood Shows in 2016. Not only is the launch of a Newcastle show planned for March 18–20, but a Murray River Timber Show Cruise as well! The latter is being investigated as working cruise for exhibitors from October 31 to November 4. With planned stops the show will open for up to two hours at various stops along the river inviting local townspeople on board to

**Leftt:** Kevin Inkster, tool inventor, demonstrates Arbortech's new TURBOshaft at the Maleny Expo in May.

**Below:** Spectacular architectural feature made for Senol Property Group in Carlton, Vic from American black walnut supplied by Britton Timbers. See www.brittontimbers.com.au.

**Right:** Rob Bird, new owner of Tasmanian Native Timbers.

see demonstrations and buy tools and equipment. Email info@iexh.com.au for exhibitor information.

## Digital design

Sturt School For Wood is renowned for its intensive accredited one year Fine Furniture Design and Technology course. In addition to 19 units of competency to complete over a 12 month period students now have access to a new design and fabrication studio. 'We need to keep at the forefront of new technology and we want to offer a better outcomes in the area of design,' said Sturt Director Mark Viner. Sturt is also now offering short courses in digital technology. See www.sturt.nsw.edu.au, (02) 4860 2083.

## Spoonies in the Tweed

Spooncarving is now a worldwide craze and Australians are increasingly succumbing to its charms. On the first weekend of October, a group of spooncarving enthusiasts led by AWR Contributing Editor, Bob Howard, will be holding the second annual *Spoonies in the Tweed*, a two day spoon carving festival on a beautiful property near the northern NSW village of Uki. Numbers will be limited to 40, with a fee of $130 to cover the supply of tools, wood, tuition, camping space, and dinner on Saturday night. See www.tweedspooncarving.com.au or call Bob on 0403 161 111.

## Turbo power

Arbortech's new tool releases have become an annual event. With the release of their TURBOshaft in May comes a new power carving tool with extended deep hollowing and detail power carving capabilities. More info from arbortech.com.au

## More space

The Melbourne Guild of Fine Woodworking has recently moved to a larger space at 14 Cottage Street, Blackburn, Vic. It's not just a matter of there being more room to move, said owner Jacqueline Boell, it allows us get people off our waiting lists and onto the workshop floor. Woodwork teacher Michael Anderson has now also joined the team at MGFW where more classes are now on offer. See www.mgfw.com.au, or phone 0413 537 490.

## New owners

Tasmanian Native Timbers is a family-owned sawmill and timber supply business based in Elizabeth Town, Tasmania. New owners Rob, Helen and Nelson Bird will continue to offer the specialty species the company is known for. Timber is sold green off the saw, air and kiln dried, and can be custom cut and dressed to suit a range of applications. Species supplied include Huon pine, blackwood, celery top pine, myrtle, blackheart sassafras, silver wattle and Tas oak. See www.tasmaniannativetimbers.com.au

## Sweet sawing

Now available in Australia from Colen Clenton are Gramercy handsaws. This dovetail saw has 19ppi and a comfortable three-finger American black walnut pistol grip handle. Phone 0408 338582 for info and to order.

## ◀ Carves and Etches

One of the newest ranges now stocked by Beyond Tools is Australian designed RedSail CNC laser carving machinery. These affordable and easy to use machines are designed for industry application and are highly suited for schools and other educational institutions and arts based applications. They are ideal for cutting and etching complex shapes into wood, acrylic, plastic, rubber and other non-metal materials and for production and fabrication of models and other items. The machines are air-assisted, have exhaust and water cooling systems and come with a CAD program. Email machinery@beyondtools.com and or visit beyondtools.com

# Product news

**A round-up of tools and products to take notice of.**

## ▲ For Great Glue-ups

Swedish-made Plano vertical press clamping systems are the total package in terms of the space saving and quality result they offer. Pressure on the lower stop activates ingenious linking arms that give all-around pressure when gluing up thick and thin boards. Vertical alignment prevents glue from sliding to one side of the joint. Glue clamps and wall rails are sold individually so systems can be customised. Distributed in Australia by Promac www.promac.com.au


## ◀ Raising the Bar

With its new PBD 40 bench drill, Bosch claims to have raised the bar for DIYers who value precision. With adjustable speed thanks to a 710 watt universal motor (there's no belt) the drill also has two gears for 'constant' speed. The motor unit lowers with the drill bit, thus maintaining work height. Include keyless chuck for bit-holding, integrated depth stop, laser crosshair, LED, robust worktable and T-slots for optional vices. Available from Bunnings for $399.
See www.bosch-do-it.com.au


## Rubs Off Rust ▲

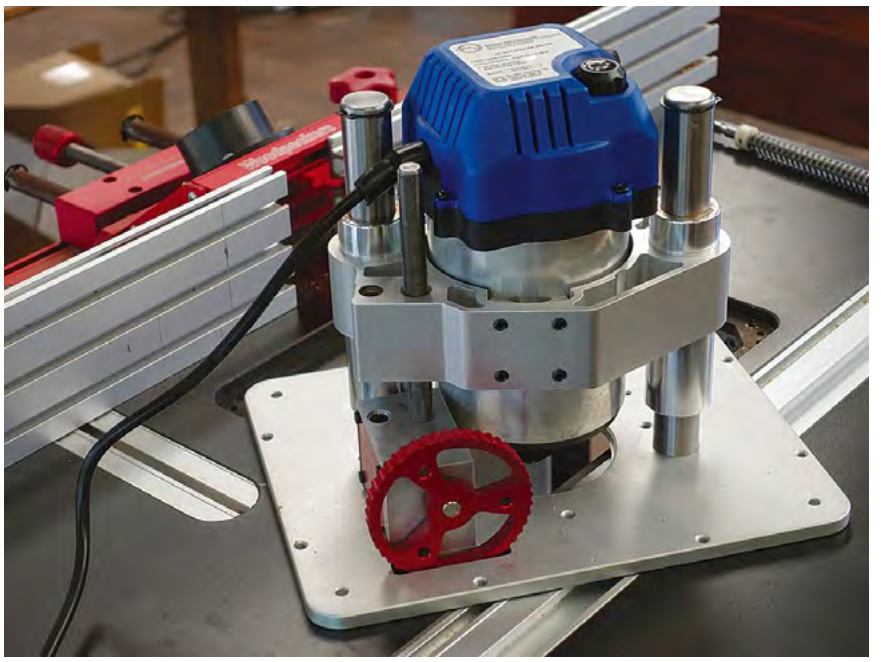
What a simple and yet brilliant product. The Sandflex is a block of abrasive that is used like a pencil eraser except it is designed for metal. According to the tech specs it's made with fine silicon carbide mixed in a rubber base. Recommended for removing light rust from cast iron and steel, it also works brilliantly on brass to quickly remove tarnish and restore shine. We recommend the medium grit block for general purpose tool renewal. Available from www.henryeckert.com or call (08) 8241 7777.

## All-Purpose Wax ➤

Gilly Stephenson's Carnauba Polish is a versatile product, rich in beeswax and of course carnauba wax. It works as a general-purpose high sheen finish that can be applied by hand or on a lathe, as it can withstand high friction and heat. Gilly Stephensons aim to provide value-for-money Australian made products by locally sourcing high quality raw materials wherever possible. Waxes are available in 2L, 1L and 100g tins from www.gillystephenson.com

## Router Table Dreaming ➤

A router table with a purpose-built motor, not an up-ended router? This snappy router lift from Woodpeckers in the USA accepts a Swisstec 1800 watt variable speed router motor body (with no handles etc). The motor is held to the router lift with three pads fitting a beautifully made rise and fall assembly. A simple handle quickly raises or lowers the cutter with a thumbwheel for micro-adjustment. And you can change bits from above the table as the router rises right up to the plate.
See www.woodworksupplies.com.au



## Quality Inserts ▲

As the name suggests Clock Movement Importers supply quartz battery and mechanical movements, but also many other woodworking requirements. CMI has a diverse range of quality German quartz clock insertion movements from 66mm to 100mm diameter in gold or silver bezels and Roman or Arabic numerals on white dials. There are also two models of 35mm metal cased quality inserts for smaller applications. Larger models have a 56mm dia x 19mm deep rear capsule. Trade and retail orders are welcome, phone (07) 3271 2555 or see www.cmi-hermle.com


## Safer Saw ▲

Bosch's new GTS1041A REAX jobsite saw will offer 'active response technology' that detects human flesh that comes in contact with the blade and drops the sawblade below the tabletop to reduce potential injury without damaging the blade. The system resets in under a minute and can activate for two incidents before replacement is needed. The saw will have 4 amp motor and cut up almost 80mm. Released in North America later this year and apparently next year in Australia.


## ◄ UV Screen for Wood

Specifically designed to protect outdoor furniture Howard SunShield is more than just 'sunscreen' for wood. This product is a rich mix of carnauba, beeswax and orange oil that will replenish natural oils in the wood, as well as maintain its colour as it helps to prevent drying and cracking in outdoor conditions. As you would expect, it needs to be used regularly for best results. See www.howardproducts.com.au for information.

## For Hands and Eyes ▼

Incra's new PushGuard combines an oversized pushblock with integrated handguard and a removable clear debris shield for much greater hand and eye safety when working at saws, router tables and jointers. The handguard sits between your hand and the cutter where a traditional guard can't be attached to the fence. Workpiece control and accuracy is aided by a thick grippy rubber pad on the base that is perfect for smooth or roughsawn wood.
Phone (03) 9776 1521, see www.woodworksupplies.com.au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# Played and Made

**Joel Sheard teaches people how to play the violin, and also how to make one.**


Joel Sheard, violinist and violin maker.

At the age of 15, I accidentally dropped and broke a violin that had belonged to my great great grandfather. At that point I had been taking lessons for about five years and after that continued to play, though on another instrument, while the old fiddle languished in its case in the backyard tin shed.

Only years later, needing something to occupy myself during an extended period of illness, did I dig out the violin and repair it, leaning on some basic understanding about working with wood that my dad had taught me in my childhood. Learning how to restore this instrument sparked a fascination with the inner workings of an object I had always taken for granted.

**Clockwise from below:**
A violin mould and selection of timbers for different components.

Some of the tools used by the author for violin making.

Checking the curve of the back plate using the catenary curve of a chain.

Creating the curved moulds is time-consuming but critical to the sound produced.


I now count that illness as a blessing since it afforded a period of intense research, trial, error, and discussion with makers far more experienced than myself as I constructed a first violin and became addicted to the craft.

Helping others to make their own instruments began early in this process as a social time with friends and eventually progressed to Saturday and school-holidays sessions open for anyone to join. Students attend my workshop as they are able over a period of about nine months to three years, and invariably enjoy the discovery process, through making their own violin, viola or cello, of the intriguing complexities that this beautiful looking and sounding object has to reveal.

## Structure and species selection

A violin's structure is a unique type of wooden box and handle, called the soundbox and neck respectively. Although instruments arising from Stradivari's or Guarneri's workbenches of the 1700s are considered a sort of pinnacle of craftsmanship, it is well within the scope of any average woodworker to construct a very playable, pleasant sounding violin, given plenty of instruction and bucket loads of patience. An amateur maker's 'first go' may well yield an instrument producing better tone than one selling for two or more thousand dollars in the shops, though more experience is often needed to refine the aesthetic and playing properties if one seeks to please the much higher professional musician's expectations.

For us in Australia the process usually begins by ordering tonewoods from one of the Northern hemisphere suppliers. Some Australian woods such as Tasmanian King Billy pine (*Athrotaxis selaginoides*) have been used with success. For many violin makers though, the conservative nature of the bowed instrument market and the availability of good quality wood leads us often to select from the traditional European tonewoods: spruce (*Picea* of various subspecies) from which to carve the front, and maple (*Acer pseudoplatanus* and other subspecies) for the back, ribs and neck. Timber specimens of a lower aggregate density and also producing a full-bodied bell-like ringing sound when struck are much preferred over heavier and duller sounding pieces.

## Shaping the moulds

The real woodwork begins by spending a seemingly inordinate amount of time cutting and filing a humble piece of plywood or MDF. This creates a beautifully curved mould around which to place the structural blocks and thin maple ribs which are approximately 1mm thick steam-bent strips which form the sides of the soundbox.

Final outline shape, and therefore a large part of the violin's acoustic properties depend on the hair-splitting detail of this simple template. Mould shape can be derived from the outline of a famous old instrument or, as a maker becomes more confident, they may occasionally produce their own subtly individual design.

One fascinating aspect of the violin's curvaceous hourglass-like geometry means that this whole rib garland can be removed from the mould when needed, since pulling the ends outward and pulling the sides outward can be done simultaneously; a feature which also results in the violin 'breathing' air in and out of the sound-holes to produce a musical note as this special shape expands and contracts the area within its perimeter.

**Right:** Spruce is a traditional tonewood choice for stringed instrument tops

**Below:** The shape of the body determines a large part of the violin's acoustic properties.

**Below right:** Beauty rather than acoustic properties is the main consideration when carving the scroll.

## Catenary curves

Carving the front and back plates is for me one of the most enjoyable parts of the process. There are several approaches to this, but I've settled on hollowing out the inside first, followed by transferring this curve to form the visible outside arching shape. This method allows the use of a single versatile template to govern the process: a fine chain. If you allow a chain to dangle between two points it forms a catenary (from the Latin *catena*, meaning 'chain') curve which, when turned upside down, renders a curve that can be seen in the architecture of many bridges, domed ceilings and flying buttresses.

On a violin, this shape means that the front and back plates can support the pressure exerted by four strings tuned up to concert pitch even though the maple and spruce is whittled away to less than 3mm thick in places. A lot of the fine work on the arching is done using a small toothed plane that allows the luthier to take sweeping curved strokes in just about any direction with delightful disregard for the troublesome curly grain of maple or pedantic straight grain of the spruce.

## Carving the scroll

The scroll, although being a simple object to carve, depends upon the artistically perceptive eye of its maker to be well executed. Apart from considerations of its total weight, it is the one feature that a maker can simply carve to look beautiful without the same acoustic considerations that impinge upon every other aspect of the instrument.

## Choice of finish

Even varnish has a significant effect on the sound quality. Usually a linseed oil and resin varnish is applied in thin layers, with coloured pigments regularly coming from the historical dye plant 'madder' (*Rubia tinctorum*). Varnishing is approached a little differently to the methods often used on items of furniture. That is, rather than allowing much varnish to soak into the wood, the layers form a skin on the outside of the instrument like a supple elastic band stretched in every direction. Many makers experiment with producing their own varnishes in order to achieve desirable acoustic properties and a unique aesthetic.

## How it sounds

The final day of this process culminates in setting up all the aspects that turn our wooden box into a musical instrument: the strings, the bridge to transfer string vibrations to the top plate and the soundpost dowel mounted internally to carry this sound through to the back plate. A bow can now pass across the strings for the first time, giving voice to timber that once lay silent.

*Photos: Sarah Sheard*

*Joel Sheard runs ongoing classes for people who wish to make their own violin, viola or cello. He lives in Bedfordale, WA and can be contacted on 0431 838 046 or jsviolins@gmail.com*

Neil Erasmus's mid-century modern inspired *Shadow* Sideboard in European beech.

**Below:** The *Shadow* dining suite purchased by the author's client was unusual in that each of the six chairs was made from a different species of wood. The table is made from European beech.

# Shadow Sideboard

## Neil Erasmus demonstrates the making of his elegant mid-century modern inspired cabinet.

This sideboard is part of growing family of works that I have designed to be affordable, yet clearly crafted and finished largely by hand. It was commissioned by a Canberra client who last year purchased one of my *Shadow* dining suites from Bungendore Wood Works Gallery.

Like the table in that setting, the sideboard was made of steamed Euro beech. Figured blackwood was chosen for the laminated handles whose curves harmonise with those of the chair. The drawers were lined in red leather as this

was used on each of the chair seats. The legs have a similar curve and I matched the front rail to the chair's horizontal back slats. The low back chair is my first foray into what is now called mid-century modern design, and the low-slung sideboard is in keeping with that.

Simple, uncluttered panels are typical of this genre of casework, keeping the look suitably restrained. As such, plain solid panels were made up for the carcase top, bottom, sides, vertical dividers and shelves. This way, wood movement is conveniently catered for without the need for complicated expanding frames. The grain runs in the same plane, allowing for free movement front-to-back.

However, for a uniform look, veneer over a man-made substrate was the only option for the doors. Shop-made sawn veneer made for understated doors that were hung on inconspicuous knife hinges (**photo 1**). The plain back panel and drawer bases were similarly constructed.

The base is solid wood throughout using simple mortise and tenon, and domino construction techniques. The inside of the unit is finished in nitrocellulose lacquer and the outside with Livos Countertop oil which is well-suited as a water barrier in case of spills.

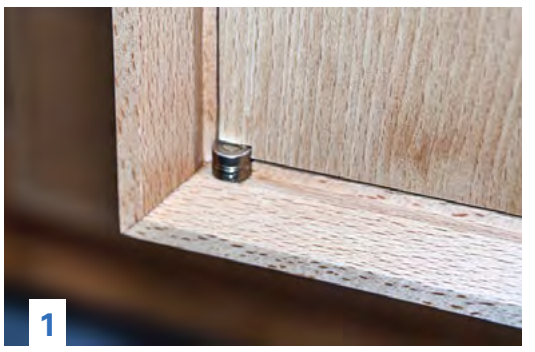
## Design and planning

As with most of my simpler pieces of furniture, I draw up basic front, side and end elevations to a scale of 1:10 and find this is enough to work from (**figs 1, 2**). Before I begin the cutting list, I decide what joinery I wish to employ, including the dimensions of those joints. This helps to determine exactly the overall length of each component, including tenons or dovetails. Areas where wood movement may impact on the specifications of a component are considered thoughtfully.

My cutting list will include overall dimensions of every piece of wood and other material in the piece, and also specify the joinery to be used. I draw the more complex parts with every detail, such as shaping, mortises and tenons, as well as measurements. Any competent maker should be able to exactly reproduce components from these blueprints as every scrap of information is there!

## First the carcase

I start with the edge-to-edge joined parts, as the finished carcase provides me with precise measurements for the doors and drawers. The panels were joined from 175–200mm wide stock. Board length permitting, aim for wrap-around grain on the top and sides. The wood for this is machined up and edge-jointed on the surface planer, then shot with a sharp No.7 or 8 handplane to cut through any case-hardening and machine ripples (*ct'd p.35*).



**1.** Doors were mounted with inconspicuous knife hinges.

**Fig. 2** **Side elevation**

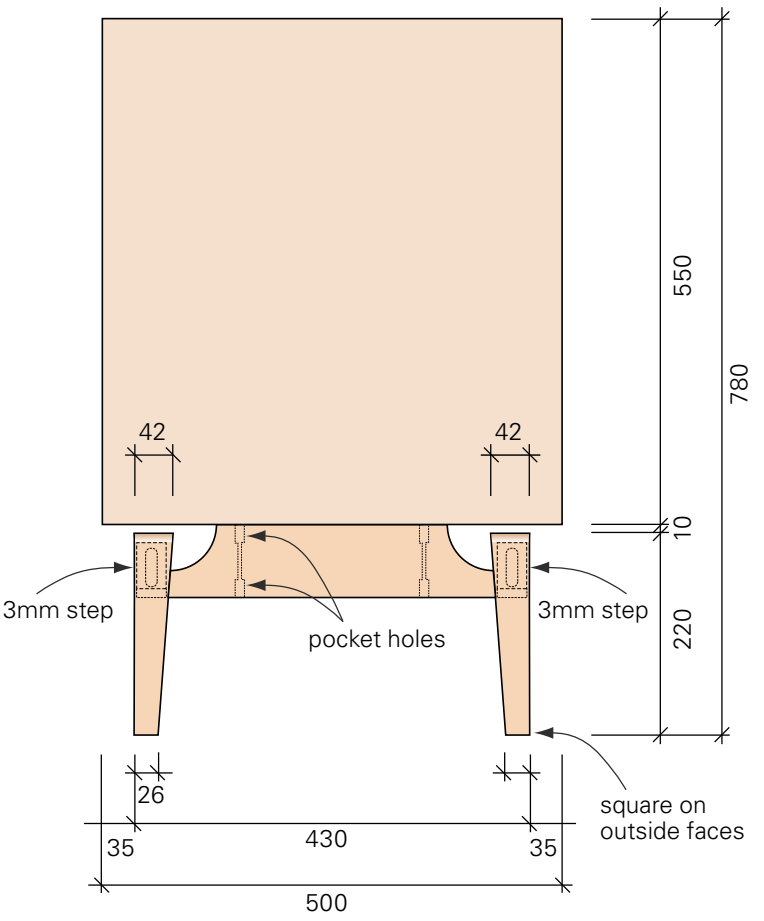



**Fig. 1** **Front elevation**

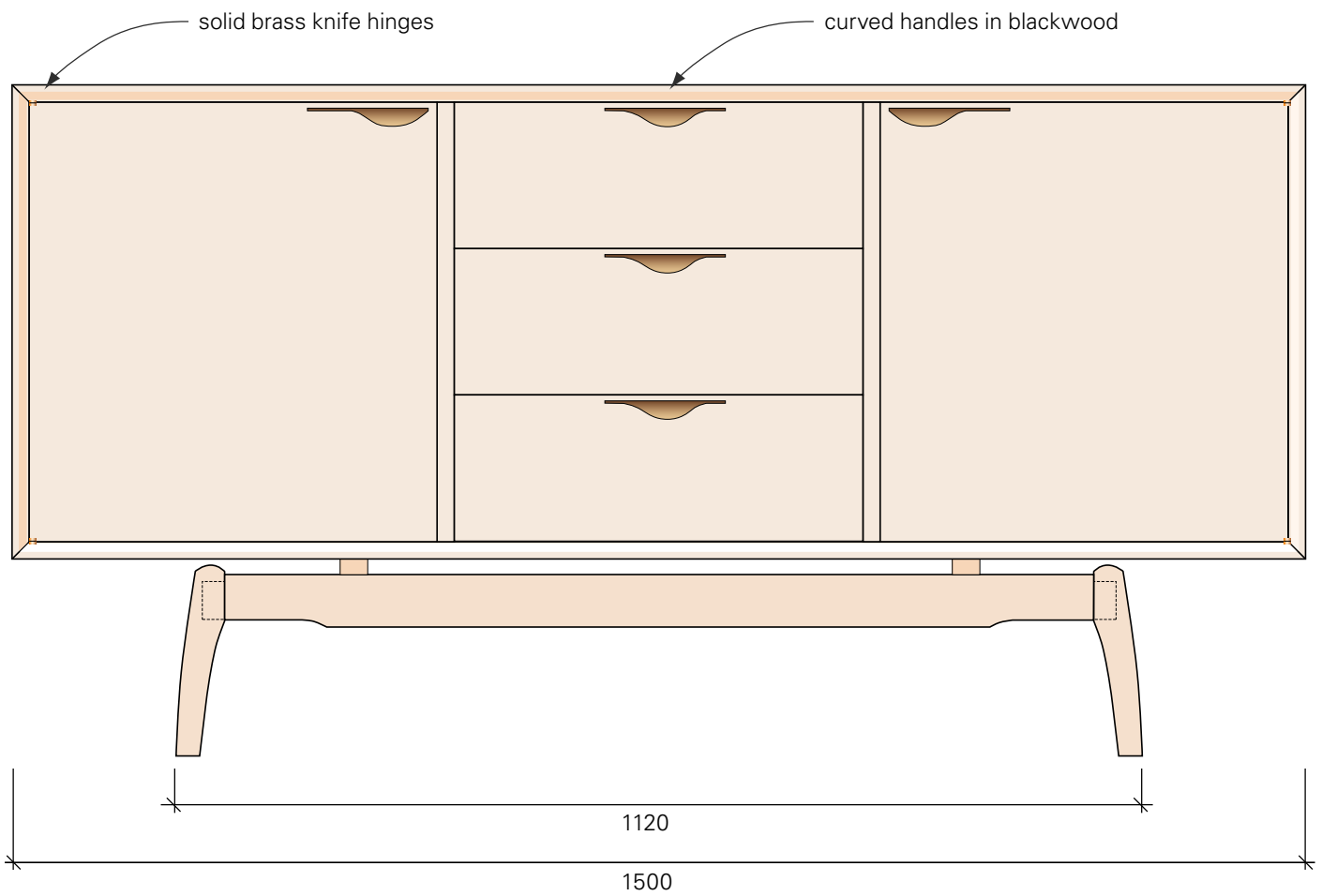
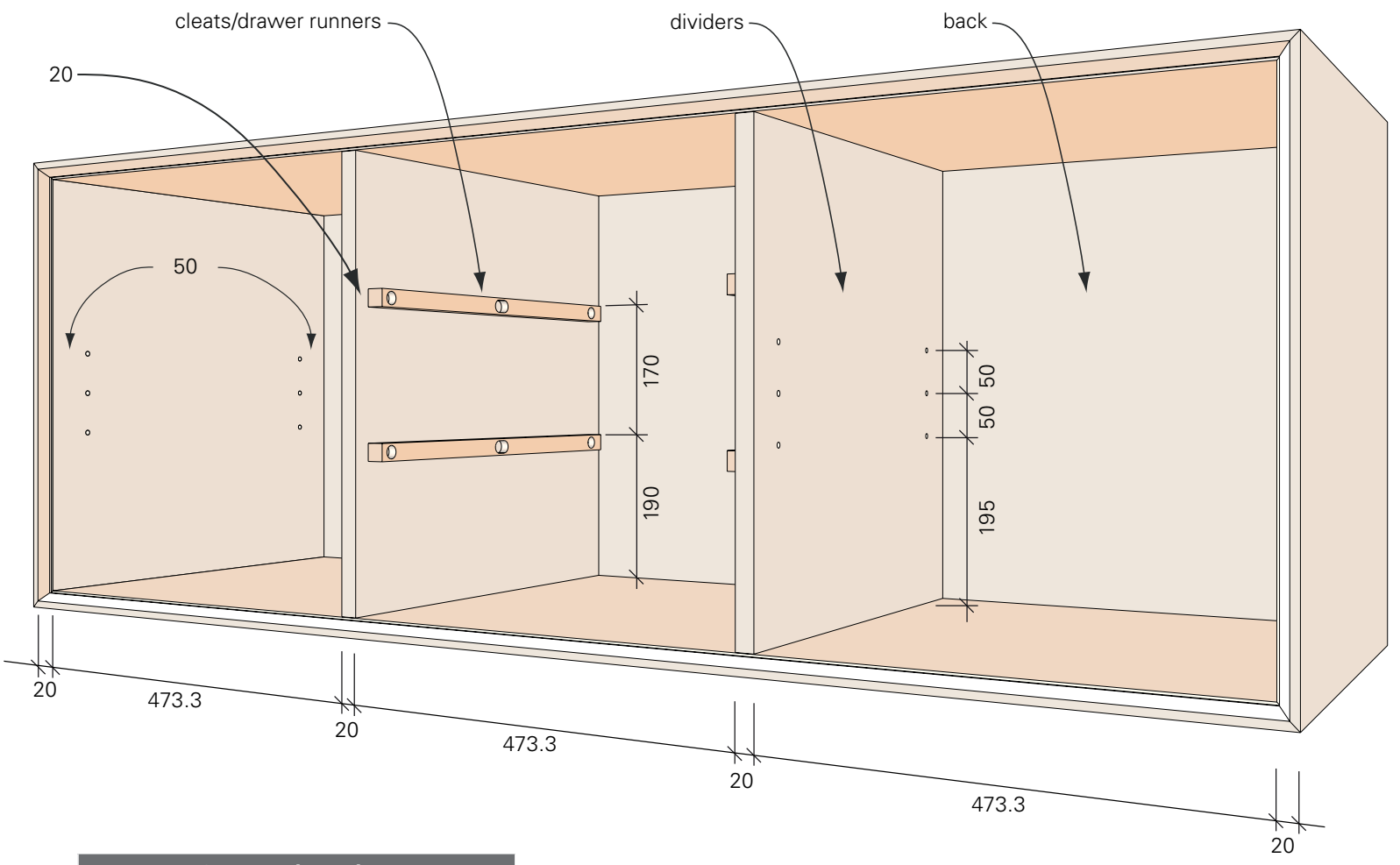


**Fig. 3 Carcase arrangement**




## CUTTING LIST (mm)

| Solid wood components (length x width x thickness) | | | | |
|---|---|---|---|---|
| Panels (top and bottom) | 2 | 1500 | 500 | 20 |
| Side panels | 2 | 550 | 500 | 20 |
| Dividers | 2 | 510 | 473 | 20 |
| Adjustable shelves | 2 | 472 | 453 | 20 |
| **Veneered door components** | | | | |
| Door panel substrates (MDF or ply) | 2 | 499 | 462.3 | 18 |
| Lippings (door sides) | 4 | 509 | 19 | 5 |
| Lippings (door top/bottom) | 4 | 472.3 | 19 | 5 |
| Veneer layons | 4 | 509 | 472.3 | 1 |
| Screwblocks for hinges (solid wood) | 4 | 50 | 15 | 9.5 |
| **Other veneered components** | | | | |
| Back panel substrate (MDF or plywood) | 1 | 1469 | 519 | 6 |
| Drawer base substrates | 3 | 459.3 | 458 | 3 |
| Veneer layons (back) | 2 | 1469 | 472.3 | 1 |
| Veneer layons (drawer bases) | 6 | 459.3 | 458 | 1 |
| These panels are not lipped as they are fitted into 5mm deep grooves in the carcase and drawer boxes. | | | | |
| **Drawer components** | | | | |
| Drawer cleats (runners) | 4 | 448 | 20 | 20 |
| Drawer fronts | 3 | 473.3 | 168 | 20 |
| Drawer sides (drawers 1 and 2) | 4 | 463 | 148 | 12 |
| Drawer sides (bottom drawer) | 2 | 463 | 168 | 12 |
| Drawer backs (drawers 1 and 2) | 2 | 449.33 | 132.5 | 12 |
| Drawer back (bottom drawer) | 1 | 449.33 | 152.5 | 12 |
| Leather | 3 | 459.5 | 458 | 1.5 |
| Drawer stop blocks | 2 | 40 | 30 | 5 |
| **Base components** | | | | |
| Shaped and tapered legs | 4 | 220 | 55 | 42 |
| Long rails | 2 | 1060 | 62 | 32 |
| Short rails | 2 | 360 | 82 | 32 |

*From p.33*

This alone should provide an excellent joint, but you can use biscuits or short dominos to help align the boards. Once joined and flushed off these parts can be cut to exact sizes, bearing in mind the outer parts are mitred on the tablesaw to these measurements. It is important to bear down firmly when holding them down as any cupping will result in a curved saw-cut (**photo 2**).

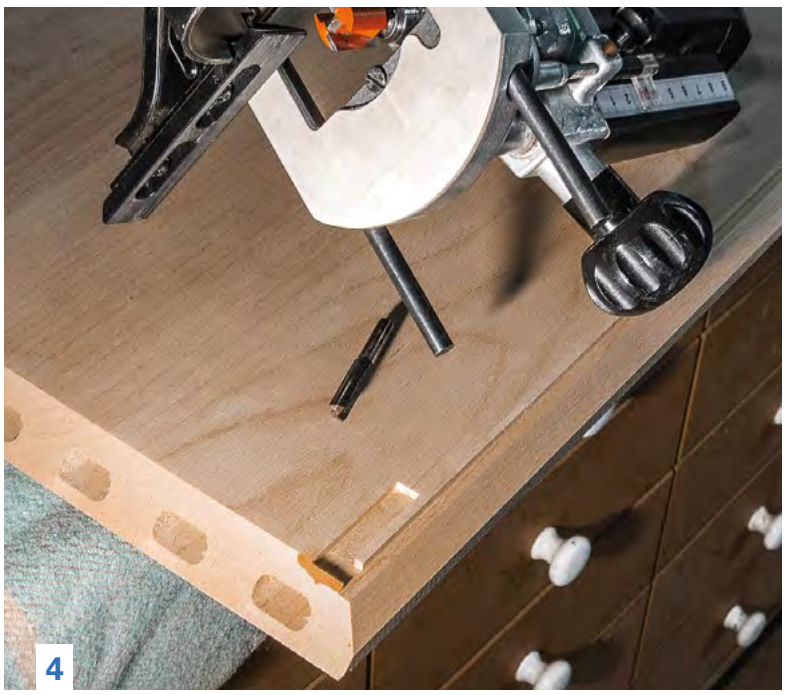
While the glue sets, I busy myself with the back panel and drawer bases. Substrates are cut slightly oversize, as are the veneer layons that are pressed to each face of each panel. After pressing, the back panel can be cut to size. The three sheets of leather may now be pressed onto the drawer bases, and put aside until later. The dimension of the back allows a little slop, about 0.5mm all the way round in a 5mm deep groove.

The mitres are dominoed, using the flap of the domino machine set at its smallest value, with a 6mm bit set for maximum penetration. To allow for a little side-to-side adjustment upon assembly, cut the sides on the smallest oscillation setting, and the top and bottom on the middle one. Ten equally spaced, matching marks are made on the outside face of each of the corners to align the machine, and the cutting can commence, with the flap bearing down on the outer face of the boards. Be sure to plunge the machine into the wood gradually. Whenever these parts are put aside for a little time, they must always be stacked to allow clear airflow (**photo 3**).

The inside faces of these four components are next grooved to take the backing, which should measure between 7.2 to 8mm thick, depending on the substrate and veneer choices. It's  important to position the inside face of the back 13mm from the back edge of the solid components, and to groove the slot 5mm deep (**fig.4**).

Machining the decorative mitred front edge is a two-step routing operation (**photo 4**). A 17mm bevel with a 45° bit is first cut, then a rebate routed into the inside corner. The front edges of the two dividers are fixed flush with this rebate, and finish at the groove for the back panel.



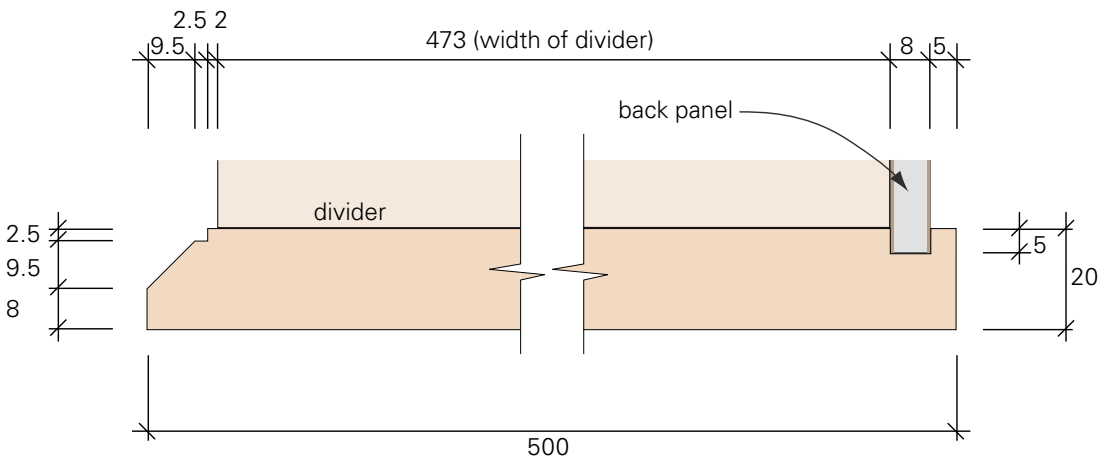



**2.** Bear down firmly when mitring on the tablesaw as any cupping will result in a curved saw-cut

**3.** If put aside for a short time, always stack components to allow clear airflow.

**4.** Machining the decorative mitred front edge is a two-step routing operation.

**Fig. 4 Section through carcase bottom**



## Making Right-Angled 'Dominos'

This joint allows maximum side-to-side grain inside the mitre, giving phenomenal strength.

Machine lengths of material (here enough for over 40 joints) to match the smaller domino slot. Half have their edges half-rounded on the router-table using a 3mm radius cutter and fence (**A**). The square-edged lengths will fit into the wider domino slots, still allowing some wiggle room.

Now set the tablesaw to cut finger joints. I replace a standard 3.2mm blade with a narrow kerf 1.7mm one. The former will work well, but the narrower blade will give more gluing surface as there are more fingers.

A special, L-sectioned jig is fixed to the sliding part of the machine with the blade cutting through the middle of it (**B**). The blade height relative to the top face of the jig is adjusted so it cuts just shy of the full thickness of the wood (6mm). A piece of wood, I call it the 'key', is thicknessed to match the sawblade kerf and is fitted to one side of the slot by the same amount.

With this set-up, make the first cut on the round-ended part by placing the end of one length against the key, then slide it over the key fixed to the jig to make successive cuts.

The first cut on the wider, square-edged piece is made by placing it against a separate 1.7mm spacer that is up against the 1.7mm fixed key. This provides a negative space on that edge to accommodate the first tongue produced on the round section (**C**). Proceed as before, then cut both parts to the same length – about 1mm shorter than the depth of the mortise.

I tested one of these 90° dominos to destruction in a metalwork vice and was truly surprised at the pressure required to fracture it (**D**).

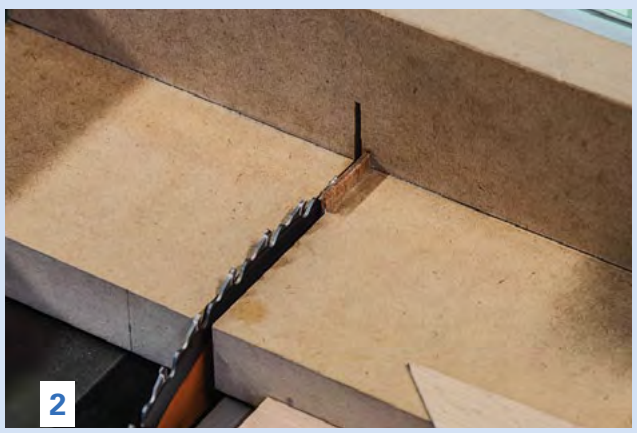
**Above:** Custom made 'right-angled' dominos

**A.** Half the lengths have rounded edges.

**B.** L-shaped jig for cutting finger joints on the tenons.

**C.** Showing how 'parts A and B' interlock.

**D.** Testing for strength – considerable force was required.

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6

**5.** A ply jig was used to mark positions for the dominos shown cut here.

**6.** Holes drilled 50mm apart for brass shelf supports.

**7.** Showing the shelves installed.

**8.** Strengthen the area where the knife hinges are fitted so they won't break out.

**9.** Assembly begins by positioning the dividers and back panel into the top and bottom panels with epoxy glue before clamping with cauls.

7

Next, I cut a rectangular piece of 18mm MDF as a domino jig, sized to match the mid-section where the drawers fit – 473.3 wide x 473 deep. This is marked on either end with domino positions, and placed perfectly in the middle of the top and bottom panels as a positioning stop for the No.8 x 40 dominos that fix the dividers. As before, the slots are nominally sized on the dividers, and enlarged on the top/bottom panels to allow a little leeway (**photo 5**).

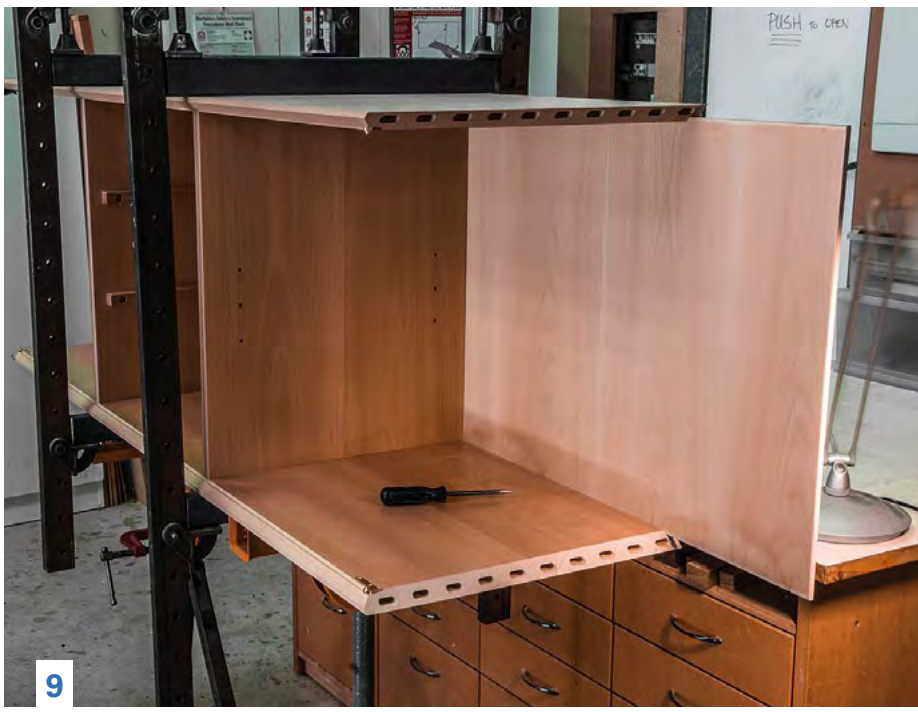
Before assembly holes are drilled to the sides and dividers for the three shelf positions (**photo 6**). These are matched on the magnet positions to the doors (**photo 7**). The four cleats or drawer runners are now dominoed into the drawer cavity area, and drilled for three screws each. Allowance is made for the carcase to expand/contract, so each runner is fixed at the front, 20mm behind the front edge of the divider, then slot-screwed in the other two positions.

The knife hinges are set into the top and bottom panels, but it's advisable to charge the short-grain where the hinge goes with superglue to convert that small area into 'plastic' that won't break out (**photo 8**).

The inside surfaces of the cabinet and back may now be sanded, joints masked off, and finished in shellac or spray-on lacquer. The parts of the hinges that fit to the carcase are now drilled and screwed in place.

The seven parts of the carcase are now ready to assemble. The dividers and back are first positioned into the top and bottom panels with epoxy glue, then clamped with cauls (**photo 9**).

8




9

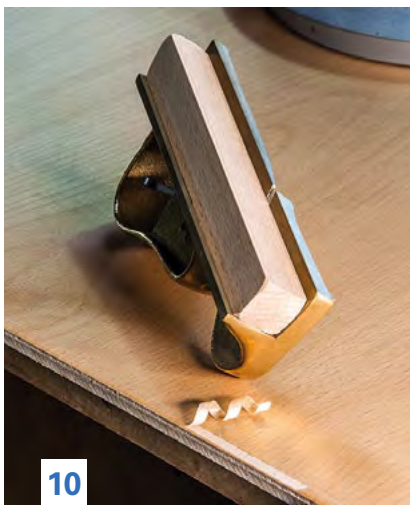
**10.** If the panel binds in the groove, you can relieve the sides with a modified side rebate plane.

**11.** Four cauls were made to clamp the mitres at right angles.

**12.** The legs and rails are then shaped on the bandsaw and spindle moulder.

**13.** The short rails are mortised with the help of 2 x 20mm spacers and a 1.5mm thick steel rule for three slots that matched in the long rails.

**14.** The ends of the long rails are tenoned to fit mortises in the legs.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The back panel may require a little 'fettling' to allow it to slide easily (**photo 10**). After this sets, the end panels can be glued in place. To make this easier, I made up four special cauls which direct the clamping pressure at right angles to the mitre (**photo 11**). Measure the diagonals for the squareness and adjust if necessary.

## The base

The legs are tapered then orientated for position and marked. For the inside face tapers I made a simple bandsaw jig (**photo 12**). Each offcut was taped back onto the leg to keep it properly angled while shaping. The legs and rails were shaped on the bandsaw and spindle moulder, and then jointed.

The short rails are mortised with the domino with the help of 2 x 20mm spacers and a 1.5mm thick steel rule to give three equally spaced slots that are matched in the long rails to suit the 10 x 50 domino (**photo 13**). The steel rule raises the short rail to give it a 1.5mm step between it and the underside of the long rail.

The top edge of the short rail is curved at each end to allow it to meet the long rail with a similar 1.5mm step, and to elevate the entire assembly so the legs are 10mm clear of the the carcase.


16

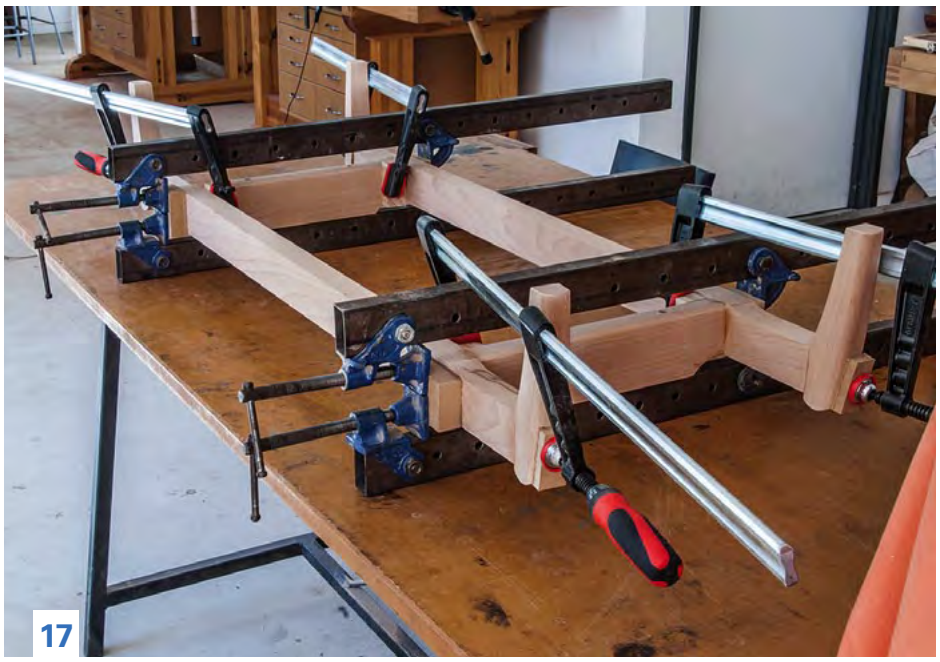
**15.** The 10mm pocket will allow some flexing of the screws as the carcase moves seasonally.

**16.** Base components ready for assembly.

**17.** Base glued and clamped.

**18.** Before veneering the doors three magnets are fitted into the inside faces.

**19.** Several 0.5mm spacers are used to fit the doors to the carcase.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19

The ends of the long rails are tenoned to fit mortises in the legs (**photo 14, fig.5**). The short rails are drilled with 10mm screw clearance holes (**photo 15**), two sets in each to fix the base to the carcase. The 10mm pocket allows some flexing of the screws as the carcase moves seasonally. **Photo 16** shows the base ready for assembly and **photo 17** shows how it was clamped up. After this, it can be oiled and fixed in place.

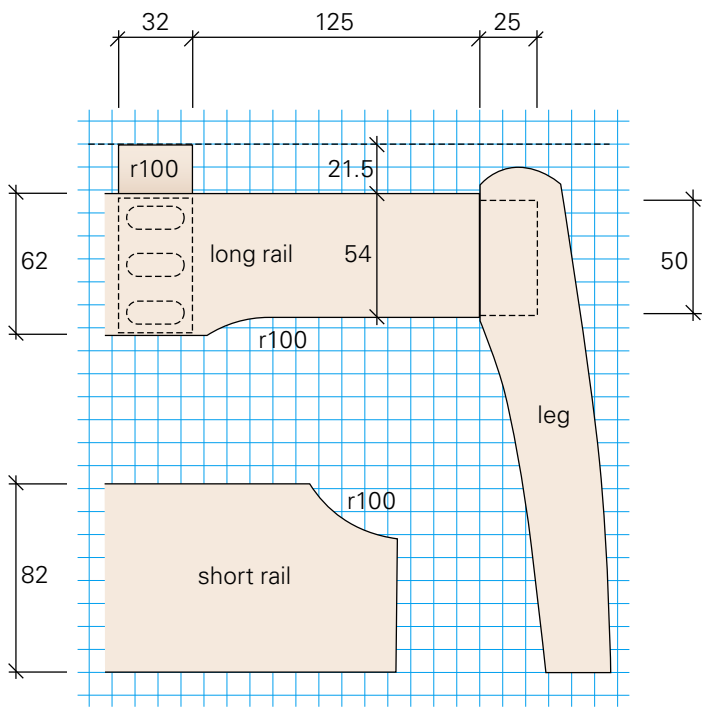
## The doors

I then proceed with the doors, drilling holes in the substrate for the magnets, and routing into edges where the hinges fit to provide solid wood blocks for the hinge screws to bite into (**photo 19**). These are glued in place, flushed off, and the mitred lippings applied. These are glued on and held in place with masking tape, and once set planed flush.

Before the veneer layons are pressed on, three 10 x 5mm magnets are fitted into the inside face of each door. Opposing magnets are placed behind a veneer in the edges of the shelves.

Make sure you mark the doors for orientation. Once the veneer layons have been flushed off, they are now ready to fit to the carcase. I use several 0.5mm spacers to aid me in this (150mm steel rules are ideal) (**photo 19**), hand planing where necessary (**photo 20**). I aim for 0.5mm on the top and sides, and up to 1mm at the bottom edge. Once I'm satisfied with the fit, the hinges are set into the top and bottom edges.

**Fig. 5** **Base frame pattern 1:4**

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**20.** Hand planing the doors to fit where necessary.

**21.** The handles are made up from five layers of 0.6mm veneers cut with the grain of each running at 90°.

**22.** Grooves for the laminated pulls are routed 7mm from the top edges of each drawer and door and to a depth of 7 or 8mm.

**23.** The handles were angled at 13° and glued in with epoxy.

## The drawers

As a number of articles have already been penned, including by me, on the subject of drawer making, all that needs to be added here is that the two top drawers each have a 20mm extension to the bottom edge of their fronts to cover the runners that support them.

The drawer fronts are half-blind dovetailed to their sides, while the backs are dominoed into the sides with No.4 dominos – remember, I was after an affordable piece of furniture with uncompromised strength.

The drawer bases will finish at a thickness of 6.5mm with the leather. The 6.5mm wide grooves in the sides and fronts start at 9mm from the bottom edges of the sides, and are 5mm deep in the sides, and 10mm deep in the front. The half-dovetail pins on the bottom edges of the drawer fronts must be sized to be about 1mm clear of the groove. The finished drawers are hand-planed to fit snugly to their respective openings, leaving a 2mm gap at the top of each to allow expansion.

## The handles

Five layers of 0.6mm veneers made a combined thickness of 3.2mm, a perfect fit in a groove cut with a standard 1/8" router cutter. Fifteen veneers are cut at 150 x 35mm, and ten at 35 x 150mm, ensuring a good cross-ply for the strength required – the first value being the along-the-grain dimension (**photo 21**).

I chose highly figured material on the outer veneer and then, to prevent them from snapping as they bend in the press, stretched over two pieces of clear packaging tape. Each set of five cross-plies, glued and wrapped in cling-wrap is pressed over a quarter-round, 1" radius former in a vacuum press, then shaped and cut to fit a 140mm groove in each drawer front and door.

The grooves, set down 7mm from the top edges of the drawers and door, are router-cut using a 1/8" down-cut spiral cutter and fence to a depth of 7 or 8mm (**photo 22**). The handles were angled in by 13° to keep them closer to the surface. A wedge made to that angle was double-side taped to the router base. Once all the grooves are cut, it's just a matter of squaring the ends of each groove, and setting the straight edge of each handle into it with epoxy (**photo 23**).

For me the processes described here simplified the making of this cabinet, but will still ensure a sound construction with appropriate allowances made for seasonal movement.

*Diagrams redrawn by Graham Sands*

*Neil Erasmus is a furniture designer/maker in Perth, WA and also teaches woodwork. Email him at: erasmus@erasmusdesigns.com*

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Andrew Potocnik puts the DW735-XE through its paces.

# Through Thick and Thin

**Andrew Potocnik puts three quality benchtop thicknessers through the mill.**

In the world of woodworking there are some givens you would love to count on. You want boards that are perfectly planed end to end, with sides that are straight and smooth enough to edge-join free of gaps.

For part-time use, smaller bench-top thicknessers are well worth considering. They run on single phase power, are portable and powerful. They have enough width capacity for most woodworker's needs and can handle timber up to 150mm thick and 330mm wide.

I was sent three machines to test, all within the same price range and offering similar functions. Out of the box all come almost fully assembled. The most you need to do is fit a handle or dust chute. In use, I not only considered how accurately they planed timber, but how clean a surface each could achieve and how much noise they emitted.

The Carbatec and Hafco models have helix cutters, which are purported to leave a superior finish on timber and with much less noise. Instead of two or three knives or blades that run the full width of the cutterhead, a series of four-sided cutters is staggered around the cylindrical cutterhead. As the cutterhead spins, a spiral of small blade cuts occurs, instead of single knives cutting the full width of a board every time it rotates.

The outer structure of the Carbatec and Hafco machines houses the motor, cutterhead and roller feed assembly, which rises and lowers by means of a winding mechanism. The DeWalt takes a different approach which cuts down on its overall height but not cutting capacity. Instead of a two-post rise and lower mechanism, there is a four-post system that eliminates the need for an outer casing.

The main question on my mind prior to flicking any switches was which

will prevail, traditional straight knife, or helical cutters?

Ability, features and performance proved to be very similar. Both helical heads left an excellent surface finish on figured redgum, although the Hafco was slightly cleaner than the Carbatec. Surprisingly, my initial feeling was that the DeWalt performed as well as the Carbatec; however as testing progressed, I felt the DeWalt knives produced a marginally cleaner surface than the two helical cutter machines, perhaps due to the slower 'finishing' feed rate compared to the other two which zip timber through quite rapidly.

Helical cutters can however be rotated and have four edges available, while the DeWalt machine comes with two sets of double-edged knives (replacements are around $109). Carbatec helix cutters come in packs of ten, costing $108 for tungsten and $65 for HSS. Packs of 10 HSS cutters for the Hafco T13S were available for $88, carbide for $104. Both the Hafco and Carbatec run 26 cutters. Doing some maths, HSS helical cost about $50 per cutting edge, as do one of the DeWalt edges. While a fresh lot of edges for each was similar seeing how long it took to blunt them all was beyond the scope of my tests.

It's generally believed that a Helical cutterhead will generate less noise, and although I used a decibel meter app on my iPad which could well be inaccurate, sound levels were similar for all and increased only marginally when planing. It was the motors that generated the most of the noise.

All machines planed timber to within a fraction of a millimetre across the width of the cut and maintained similar consistency along the length of boards of up to 800mm that I tested. Snipe was evident in many cases, but can be overcome by allowing waste at ends of boards. Each machine has depth of cut gauges and repeat cut settings but set-ups vary.

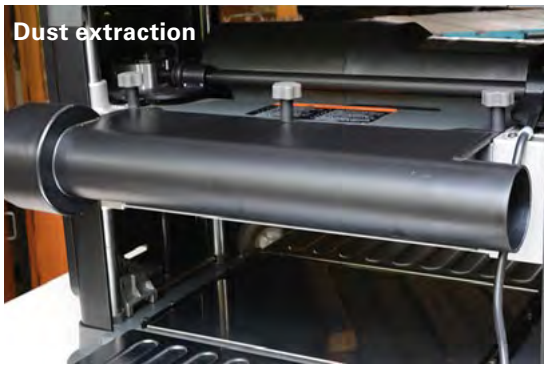
Overall it is very difficult to split these machines based on features, quality of cut surface, set-up and accuracy. All performed very well in each of these areas. Choice may come down to brand preference, size, weight, cost or recommendations of long-term users of each machine, who will vouch for how well the blades last and long term reliability and performance.

I was pleased with each of the three and really enjoyed using the DeWalt.Finally though, after using the machines in my workshop for three months I found I was using the Carbatec the most as it's more flexible (being able to thickness down to 3.25mm) and the winding mechanism to raise or lower the cutter head is logically set up. The Carbatec was the one I wanted to keep.

*Reviews of each machine follow.*
*Photos: Andrew Potocnik.*

| | CARBATEC CT 330 X | HAFCO T–13S | DEWALT DW 735-XE |
|---|---|---|---|
| **RRP*** | $819 | $693 | $945 |
| **Weight** | 37.8kg | 28kg | 42.6kg |
| **Number of blades** | 26 helical | 26 helical | 3 straight (spare set supplied) |
| **Width of cut** | 330mm | 330mm | 330mm |
| **Maximum thickness capacity** | 152mm | 152mm | 152mm |
| **Feed rate** | 26 fpm | 26 fpm | 14–22 fpm |
| **Maximum cutting depth** | 3mm @ 152mm wide material / 1.5mm @ 330mm | 3.3mm @ 152.4mm wide material / 1.5mm @ 330.2mm | 3mm max according to provided information |
| **Power** | 1.8 kw | 1.8 kw | 1.8 kw |
| **Safety switch / reset button** | no / yes | no / yes | yes / yes |
| **Footprint** | 550 x 330mm | 510mm x 320mm | 520 x 380mm |
| **Height of machine** | 510mm | 410mm plus 80mm when handle is fitted | 455mm fully raised |
| **Front extension table** | 270mm supplied | 230mm supplied | accessory available |
| **Rear extension table** | 270mm supplied | 230mm supplied | accessory available |
| **Sound emitted @ 0.5m without cutting** | 64 dB | 64 dB | 67 dB (95 dB in booklet) |
| **Sound emitted @ 0.5m when cutting 1mm on 115mm wide redgum** | 65 dB | 64 dB | 68 dB |

** Prices noted were sourced from the internet, check around for best prices.*


Dust extraction

On-board tool storage


Cutterheads

$819



Depth adjustment

## Carbatec CT 330X

This machine is quite tall at 616mm high with a fairly standard footprint of 510 x 300mm and weighs 38kg, so it's preferable to have two people on hand to move it.

Set-up was quick and easy; simply fit the raise and lower handle with an allen key that's stored in a housing that you can later wind the power lead around for neat storage. Plug the machine in and it's ready for work.

Fold-up in- and out-feed tables increase support for timber as it enters and exits. When folded, the front table acts as a wonderful cover for the cutterhead assembly, however the out-feed won't close fully with the dust chute in place. If, for some reason the tables are knocked out of alignment, there are screws for resetting.

The dust chute is simple to fit; just slip it into place, hand tighten a couple of plastic knobs and connect to a dust extractor. Openings at either end will accommodate either a 2.5" (64mm) or 4" (102mm) hose, and when fitted to my dust extractor via the larger hose I found little residue on the thicknesser table after numerous passes of timber.

The information booklet advised not to thickness material less than 5mm thick or 19mm wide, and no shorter than 178mm. It also advises on what kind of wood not to use on this machine, how to deal with snipe and warped wood, and has a troubleshooting chart.

Putting it to the test I pushed the maximum cut of 3mm on a piece of 100mm wide blackwood and the machine did not falter leaving a very clean surface, even when I turned the board around and fed it in against the grain. At no stage did the motor sound as if it was straining. Changing to mountain ash of 70mm width the result was fantastic, so I eventually wound the cutterhead down to its thinnest capacity and the wood came through perfectly machined to 3.25mm – better than the 5mm stated in the manual – bonus!

A 'snipe lock' doubles as a cutter lock and did reduce snipe when engaged, although not completely. My digital vernier calipers did however find a variation of less than 0.05mm in thickness across a 280mm board and along its 600mm length. I think that's pretty good, especially without any 'tweaking' of factory settings!

Like the Hafco, this machine is fitted with a helical head and I was keen to compare sound output. I used an app downloaded to my ipad and found however that all three machines tested emitted near identical levels of noise which increased only marginally when cutting, no matter how wide the material was.

Noise aside, this machine, like the others, had repeat cut settings for consistently thicknessing boards to the same size, and depth of cut gauges at the front that show stock removal on the current cut.

This thicknesser certainly has many positives, but one issue I have with machines configured for global distribution is inconsistencies in measurements used. The manual here refers to a 'switch key' that can be locked however the one on the machine cannot be locked. There are also some readings in metric and others in imperial. Thankfully, I'm bi-lingual!

*Details at www.carbatec.com.au*

# Hafco T13S

$693


This machine was the lightest tested and was the easiest to manouevre due its small overall size of 510 x 320mm footprint and 410mm height. It is also the cheapest tested and yet has a spiral head with HSS cutters.

The standard universal 1.8kw 2.4 hp, 240 volt single phase motor features power feed rollers and anti-kickback fingers similar to the other machines tested, so it was interesting to see whether the helical cutters would make a difference to noise or quality of cut surface.

Set-up required very little effort. Lift out of the box, attach a dust chute (which angles left or right) and connect a 100 or 63mm hose, plug the machine in and it's ready to go. Allen keys required to attach the dust chute are housed above the cutterhead, so you don't need any extra tools.

Like the other machines, the Hafco has a repeat cutting depth mechanism, a depth of cut gauge and extension in-feed and out-feed tables. These fold up for storage or transportation but not with the dust chute in place. The chute also obscures clearly detailed information regarding rotation of cutters which is printed on the back of the cutterhead assembly.

As mentioned noise levels for all machines were similar. It appears motors are the culprit when it comes to the noise created by these machines – all require hearing protection.

The single speed in-feed zipped timber through at a rapid rate, but the motor didn't mind this. It didn't show any audible signs of strain when I machined 260mm wide redgum burl, nor when set to its maximum cutting depth of 3mm. The machine buzzed along without a fuss leaving a clean surface on all timber trialed. I did detect snipe on some longer boards and the machine will not handle timber thinner than 19mm. This can of course be overcome by inserting a support board which, in effect, reduces the distance between the cutters and the main bed.

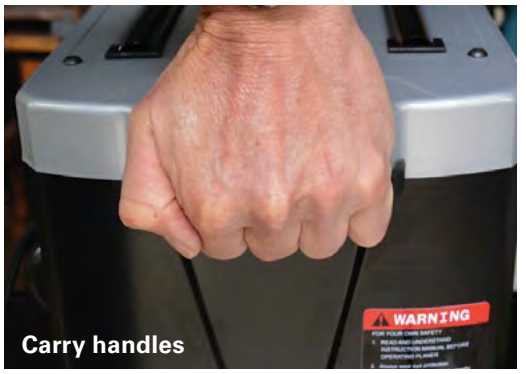
The flat machine top has two rollers which come in handy when returning thicknessed boards back for subsequent passes, or just for resting timber while other boards are machined. The raise and lower handle is also located on top of the machine and adds 80mm to its overall height.

Text provided with the machine is clearly presented and thorough. The trouble shooting guide doesn't give a great deal of detail, but there is a good safety instructions chart which can be photocopied and posted next to the machine to remind users to beware.

Pictures make it easy to identify components referred to with regard to safety and correct operation, except the switch shown in the booklet differs as it flips up to turn on, and is pressed down to stop, which I feel is safer than the one on the test machine. I found the flexible clear plastic dust cover makes it a bit awkward to operate. There is also reference to a 'lockout key' which does not exist on the test machine. Like the Carbatec machine there is room for improvement with consistent use of metric and imperial measurements in both the instruction manual and gauges on the machine.

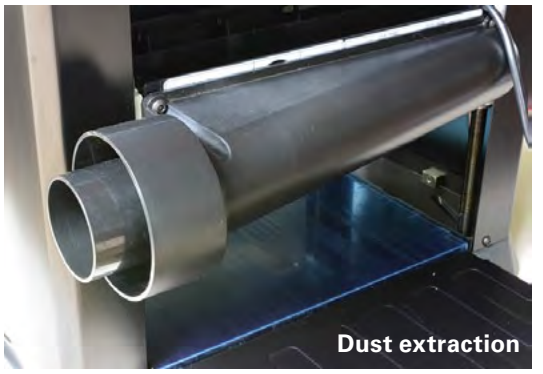
Overall, based on price, size and performance, this machine won't let you down.

*More information from*
*www.machineryhouse.com.au*

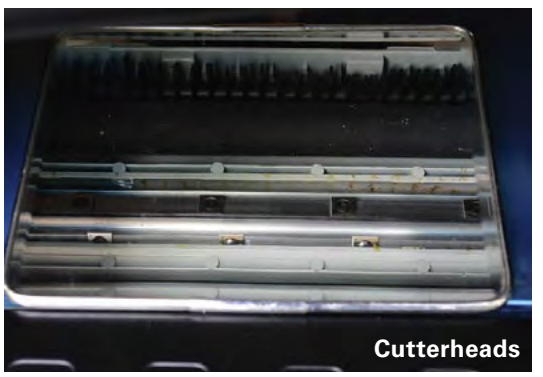


Carry handles

Carry handles


Dust extraction

Depth adjustment


Cutterheads

$945

# DEWALT DW735-XE

This is a compact unit with a footprint of 520 x 380mm and height of 455mm with the cutterhead fully raised. At 42.6kg a two-person lift is safer. Moulded plastic upper handles or hand grips on the base make it easy to move around.

Assembly out of the box is easy: fit the raise / lower handle with the allen key (housed on the machine), clip on a dust chute, connect to single phase and you're ready to go…

The switch is a lift-up start, press-down to stop assembly which I found easy to locate and operate. A padlock can be fitted to lock the machine, but restricted access might make this difficult.

With a maximum 330mm width and 152mm thickness capacity, the 1800 watt motor is capable of taking a cut of 3.2mm in one pass. Obviously, this depth of cut would be too much for a 300mm board, so a cutting gauge at the front shows recommended cutting depth for various boards widths. It also indicates how much timber will be removed as timber is fed into the machine.


On-board tool storage

Dust extraction


Carry handles


Cutterheads


Depth adjustment

A built-in 'fan-assisted chip ejection' system, blows shavings out at a high rate (2–3m), meaning you don't need a dust extractor; in fact, no dust extractor will keep up with the flow of shavings. Excellent for outdoor or site use, but messy for the workshop. In use the shavings certainly did fly and a few were left on the in-feed table.

The information booklet stated that sound emitted is 95 db (with an uncertainty level of 3.3 db). My iPad app showed a lower reading, and to my surprise, increased only marginally as the three blade cutterhead went to work. Once again, hearing protection is a must for all machines.

Machining 70mm wide mountain ash I set the cut to its maximum of 3.2mm and the motor performed without any audible strain, producing a clean cut even when I fed timber through against the grain. Swapping to a redgum burl of about 250mm width results were equally good. Some 280mm wide blackwood planed at a cut of 1.5mm resulted in a clean surface and no strain on the motor. The slower feed rate of 179 cuts per inch left a slightly better finish than the faster setting, which with new blades was still very good. I couldn't detect any snipe on timber, no matter the depth of cut or feed rate, but unfortunately the minimum thickness possible on this machine is 12.7mm.

Features include a turret stop for repetitive planing at pre-set depths, an extra set of double-sided blades and extension in- and out-feed tables that can be purchased separately.

Best part is once you've finished work, wind down the cutterhead and the machine compresses to a height of merely 350mm, ideal for transporting or storing until the next project. A cord wrap at the back of the unit prevents tripping on the electrical cord, and off you go.

I would like to see consistency in measurements indicated on the machine. Once again there is a mixture of metric and imperial used; however, only sometimes are both provided. This should also extend to measurements in information manuals too, but this is a problem that arises when catering for sales in countries that use different measuring systems.

*Information from www.dewalt.com.au*

*Andrew Potocnik is a wood artist and woodwork teacher who lives in Melbourne. Email: andrewpotocnik@telstra.com*

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# How to French Polish

**Understand the basics, but don't get bogged down in theory as you experiment and practise to gain skill. Story by Frank van Brunschot.**

**Below:** Detail of the author's *Collector's Cabinet* showing French polished finish.

**Opposite:** Frank van Brunschot demonstrates the final straightening and pulling over stage of the process.

This article aims to get woodworkers thinking more about finishing as a craft and skill in its own right, rather than something ad hoc at the end of the making process. French polishing is very labour intensive and is not always a practical or appropriate finish, but a general understanding of how it works is an excellent foundation for polishing in general.

## Core principles

A comprehensive article on French polishing would fill a small book and if you were to read ten different books on French polishing you would get ten different approaches. Although there are many variations in terms of techniques the core principles are the same, and what I would like to focus on here and hopefully clearly explain.

It takes many years to confidently convert theory into practice. There is a significant tactile side to French polishing; you get a certain feel for how the polishing rubber is moving along the surface, and you learn to read this and the marks left behind. This side of polishing is difficult to convey theoretically. I have discovered over the years that the best way to learn French polishing is to understand the basics without getting bogged down in theory, and then be prepared to experiment and play with the materials and processes. Learn from your mistakes, take notes and understand what has happened and why.

## Types of finish

There are many different finishes available to woodworkers and they all can be broken down into two categories: film forming finishes and oil finishes.

**Film forming finishes** as the name suggests harden to a coating or film that acts as a barrier stopping moisture or dirt from being absorbed into the grain of the timber. They harden through the evaporation of water or solvents. Examples are polyurethanes, lacquer and French polish.

**Oil finishes** on the other hand are based on drying oils; linseed, tung and poppy seed oil, and others. These oils harden slowly, oxygen in the air instigates a chemical reaction in which the oil molecules crosslink and gradually harden. These finishes are not as durable as film forming finishes.

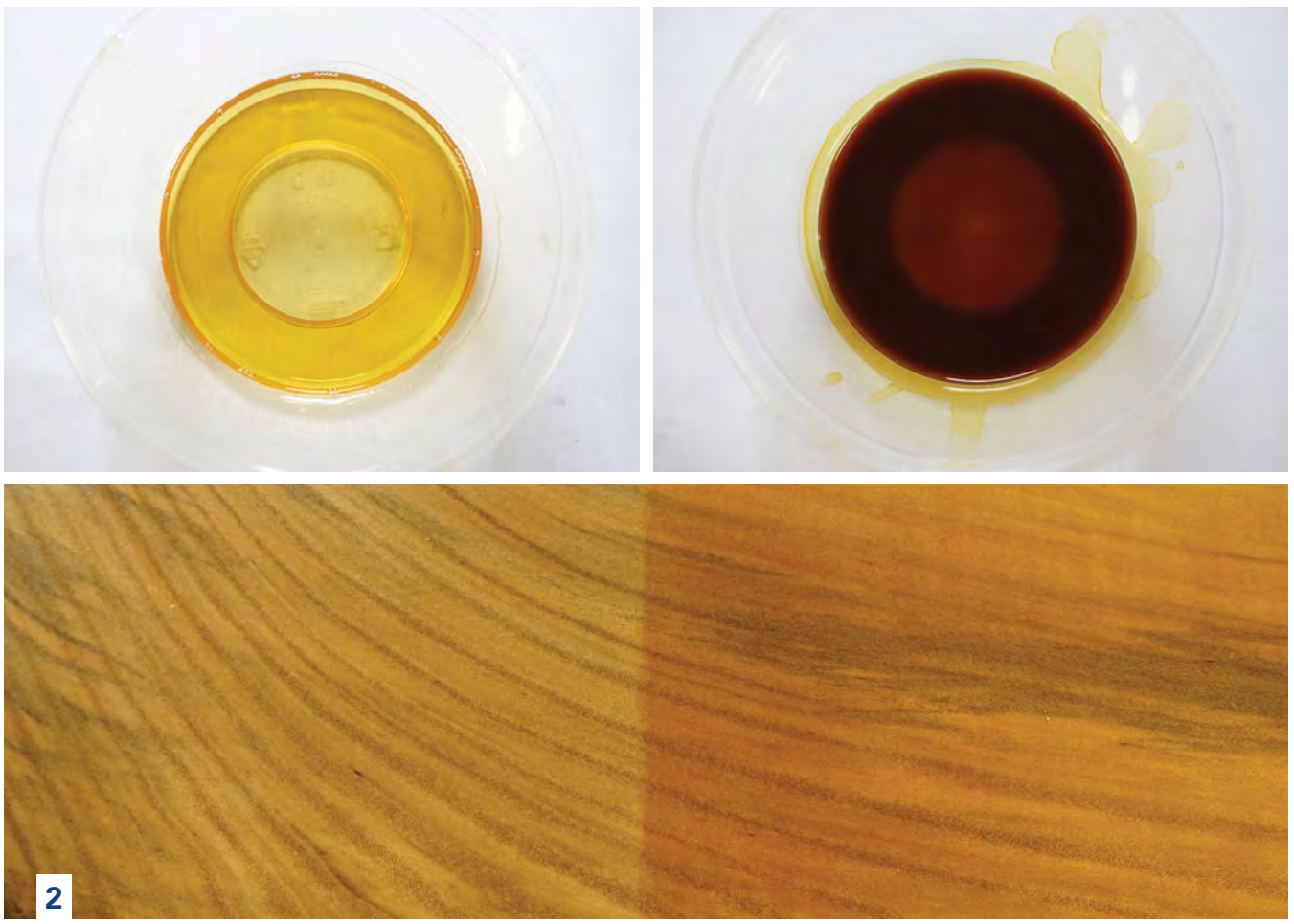
Another group of finishes harden through a chemical reaction, examples are two-pack finishes and acid-cured lacquer. Film forming finishes are better in terms of long-term protection of timber.

The clarity and depth of lustre that is achieved in French polish comes from building an extremely thin film of polish on a surface that is perfectly flat, not in the sense of a straightedge, but in terms of having no tiny holes or openings in the surface. All hardwoods (anything that is not a conifer) have tiny pores, which vary in size depending on the species, e.g. oak has large pores and walnut has smaller pores which are filled in during the French polishing process.

## Open and closed grain

It is important to understand the difference between an open grain finish and a closed grain finish. With open finishes, the pores are not filled and this diffuses light and creates a less reflective low sheen finish. With closed grain finishes, the pores are completely filled, creating a very smooth, even and reflective surface.

1



2

1. **Left to right:** Orange, blond, garnet and button shellac types.
2. Solutions of blond and orange shellac directly above the colour produced after a few coats on the same piece of timber.
3. Pumice powder, paraffin oil and ethanol are also used.


3

## Shellac

**Orange Shellac**
This is the most common form of shellac and readily available. It has not been heavily processed and contains a lot of natural waxes. Orange shellac can be used as sealer and grain filler under French polish. The waxy content makes it a thick and heavy shellac with a lot of body. Orange shellac works well on darker timbers such as cedar, silky oak and blackwood and is not recommended for use on lighter coloured timbers. The wax content also makes it softer than de-waxed shellac.

**Blond, Super Blond and Lemon Shellac**
These shellacs are lighter in colour and therefore more suited to lighter coloured woods. You can buy both waxy and de-waxed versions. De-waxed shellac dries to a harder finish.

**Garnet and Button Shellac**
Darker shellacs like these are best used on darker timbers. They are often used when re-finishing antiques.

The shellacs shown here are readily available to woodworkers. Shellac is extensively used in other industries and many grades and varieties are sold under different names. The main thing the wood finisher needs to consider is suiting the colour of the shellac to the colour of the timber being polished. As a general rule, light timber requires light shellac and dark timber, dark shellac.

The wax content in shellac gives the polish more body and makes it easier to sand. The disadvantage is that it dries softer. It's best to use de-waxed shellac for top coats.

## Mixing Two Pound Cut Shellac

For French polishing the 'cut' is the ratio of dry shellac to alcohol. A two pound cut is two imperial pounds of dry shellac mixed with a gallon of alcohol. This is best converted to a smaller metric quantity, as a gallon is far too large for small scale use.

Shellac is best mixed in an opaque wide mouth container (not metal). Flakes are added first, then the alcohol. This needs to be left to dissolve for 24 to 48 hours, stirring occasionally. A convenient quantity for a two pound cut is 150 grams of dry shellac flakes dissolved in 630ml of alcohol.

## Other materials

**Pumice powder** derives from volcanic rock and is used as a gentle abrasive. It is sold in different grades – the finest FFFF grade is used for grain filling.

**Paraffin oil** for lubricating the rubber can be purchased from most hardware stores.

**Ethanol**, otherwise known as general purpose methylated sprits, obtained from the hardware store is fine to use.

*From p.49* French polishing can therefore be simply explained as a polishing technique, which uses shellac and pumice to fill the pores of timber (**fig.1**).

## Surface preparation

Sanding seems to be a contentious subject among woodworkers. Some seem to think it should be virtually never used while others overly rely on it. Sanding or surface preparation is a very important part of the polishing process and is rarely done well. It's important to view sanding as a polishing technique rather than part of the cabinetmaking process. Here it is a process of gradually making the surface smooth.

Sandpaper grits used in polishing are generally 180, 240, 320 and 400. It's important to sand well with each grade of abrasive paper refining the cuts left from the preceding grits. Cheap abrasives are a waste of time and money. Always use good quality paper and readily discard it when blunt or clogged.

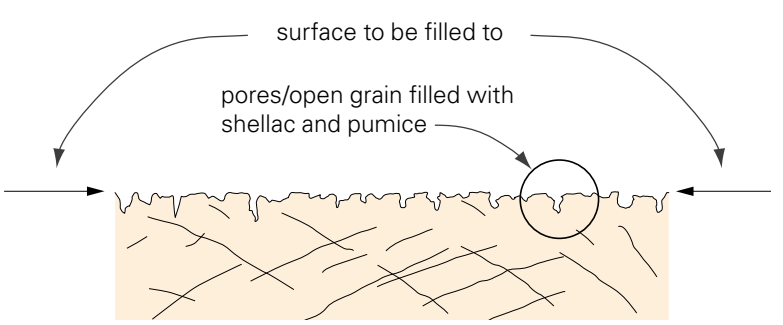
A common mistake with sanding is the notion that more sanding with finer and finer grits is better. Problems arise when the finer grits go blunt. When blunt or clogged paper is used excessively it becomes more of a burnishing technique rather than a cutting process.

Burnishing is in itself a useful technique, best used under a wax finish. Burnishing uncoated timber involves rubbing with pressure. Heat builds up from friction, and this combined with pressure changes the surface of the timber, because it compresses the fibres to case-harden the timber. This is important to bear in mind when finishing some of the Australian hardwoods. The surface of the timber can become extremely hard and shiny; this, combined with some of the natural oils in timber, can create adhesion problems depending on the finish used.

## Lasting bonds

There are three main mechanisms involved in bonding a finish to a substrate: absorption, chemical bonding, and mechanical bonding or interlocking. The first and last are of most concern to the wood finisher (*ct'd p.53*).

**Fig. 1 Grain filling enlargement**



## The French Polishing Rubber

The French polishing rubber can at first glance appear a little crude but it is actually quite a sophisticated tool as it is the means of transferring and building the finish. Essentially it is compressed cotton wadding folded a certain way, then covered in cloth. I like to use upholsterers wadding – old wadding out of upholstered chairs is excellent. You can buy polishers cotton wadding from finishing and restoration product suppliers.

Linen or heavy drill cotton is best and white fabrics are better as alcohol can melt dyes. Fabric, even old linen tea towels, can be sourced from the op shop. For the grinding process a heavy drill cotton is best.

The compressed wadding acts as a reservoir for the polish. The polish can be fed out at a controlled rate as the rubber is pressed against the surface. To load the rubber the cloth cover is opened up and shellac added directly to the back of the wadding (when thinning shellac always add the alcohol first). It is best to have several different rubbers for the different stages of polishing, as well as different shellacs (I keep mine in jars).

## Making a polishing rubber

The wadding is basically formed into the shape of a large egg as it's best to keep a 'point' at one end for getting into corners. There are many different methods of forming the rubber, wrapping and folding the cloth cover. The photo sequence shows one way.

**1.** Take a 150–200mm square of cotton or linen and place the wadding diagonally in the centre.

**2.** The wadding is the reservoir for the polish and is periodically topped up.

**3.** Take two opposite corners and pull firmly around the wadding, pinch the cloth around the wadding with your thumb and forefinger.

**4.** Now fold the front of the rubber by pulling the cloth in towards the centre.

**5.** Hold this with your forefinger, twist each side in, and when they meet, hold the rubber with one hand as you twist both sides together towards the other end.

**6.** Transfer the rubber to your other hand to twist the other end one or two times before pulling it back across the top.

**7.** The face of the rubber should now be tightly covered and there should be no loose bits of cloth.

**8.** The internal wadding should now be a firmly compressed shape that fits comfortably into your hand.


1


2


3


4


5


6


7


8

The absorption or wetting mechanism can simply be thought of as how well a finish flows into all the tiny crevices on the surface. Poor wetting is when the finish fails to flow well into all the small valleys and crevices on the timber surface. This reduces the amount of surface area in contact with the finish. Poor wetting can result from surface contaminants such as oils, wax and grease.

Mechanical interlocking is the most common form of bonding a finish to timber. The surface of timber is full of tiny irregularities and micro voids (pores or open grain). The finish flows into these areas then hardens and locks on mechanically to the substrate.

## Versatile shellac

Shellac is a very versatile polishing material. Derived from a resinous secretion of the lac bug it is a natural non-toxic material that has excellent adhesion to virtually any surface. It also remains slightly flexible, which makes it perfect for wood. Many people will argue that shellac is too soft a finish to last, and while I agree it's not always appropriate (for example a modern dining tabletop), for the vast majority of pieces it is by far the best finish. I have seen many shellac based finishes well over 100 years old still in excellent condition.

Shellac dries through evaporation of the solvent (alcohol). Being a finish that does not crosslink it can be re-softened with alcohol, which is both an advantage and a disadvantage. The advantage is that an old finish can be successfully repaired and reworked; the disadvantage is that it is more susceptible to marks from alcoholic drinks, heat and moisture.

Shellac is often used as a general sealer or barrier coat under other finishes. When doing this it is best to keep in mind that the adhesion of lacquer and polyurethane over shellac is not ideal. Problems can be greatly reduced by using de-waxed shellac.

Shellac is purchased in a dry form as either flakes, granules or buttons. The raw material is mixed with denatured alcohol (ethanol or methylated spirits). The ratio of this mixture is referred to as the 'cut', for example 'one pound cut' or 'two pound cut' (*see p.51*).

## Suppliers of French polishing materials

**Carbatec:** www.carbatec.com.au

**Feast Watson:** www.feastwatson.com.au

**Ubeaut Polishes:** ubeaut.com.au

**The Woodworks Book & Tool Co:** thewoodworks.com.au

**Bunnings Warehouses:** www.bunnings.com.au

## The three stages

Although there is really a gradual transition, French polishing can be broken down in three stages: grain filling, bodying, and straightening, pulling over and spiriting off. The French polisher's 'rubber' is the means of applying and building the finish.

The whole process is best done over two or three days Although shellac will be touch-dry within seconds or minutes, it takes longer for the solvent to fully evaporate – which is why the polish can look physically thinner the next day.

## 1. Grain filling or grinding with pumice

Pumice powder is used to fill the open grain up to the level of the surrounding wood. When mixed with shellac, this fine white powder becomes translucent which is why it is such an excellent grain filler, as the true colour of the timber is still apparent. Other grain fillers such as plaster of Paris are coloured with powdered pigments to match the timber. This is the most critical stage of polishing and it takes experience to know what to look for.

One method of grain filling is to lay a few coats of polish directly onto the timber with a brush, a cloth or even a spray gun. Once dry, pumice is sprinkled onto the surface, and a rubber filled with alcohol and only 5% shellac is then used.

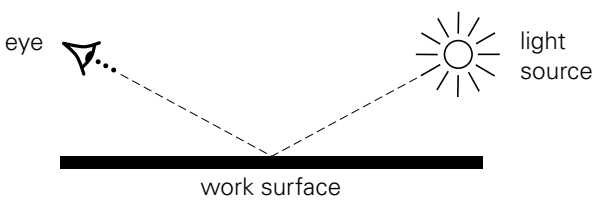
The rubber is moved across the surface in tight circles, and a reasonable amount of pressure is needed at this stage. At this stage the alcohol in the rubber is softening the previously applied shellac. At the same time the pumice abrades the surface while the pressure of the rubber forces both polish and pumice into the grain.

It is important not to overdo the pumice. Different woods require more or less time and pumice to fill them and pumice may need to be applied several times. Work gradually, as pumice will soon build up on the surface rather than in the grain. This can be easily felt by running your hand across the surface. Any rough areas will need to be left to dry overnight then lightly sanded out with 400 grit paper.

## The importance of lighting

Natural light coming in at a 45° angle to the piece you are working on is best (**fig.2**). Looking at your workpiece from a low angle and towards the light source you should be able to see open grain. Gradually the grain will fill and the wood will take on a reflective sheen.

**Fig. 2 Surface flatness**




**Below:** Small panels can be secured to the bench with blue tack.

**Right:** Sprinkling pumice onto to begin the first stage of grinding or grain filling.

**Far right:** After grain filling the rubber will start to need lubricating with a few drops of parafin oil.

## Other grain filling methods

Another method of starts by laying on a couple of coats of polish, then using pumice with a rubber loaded with just alcohol. This method is best used over a stained timber.

You can also work directly on raw timber using a rubber loaded with a roughly 50/50 shellac and alcohol mix. Pumice is sprinkled on and the shellac in the rubber rather than the shellac on the surface binds the pumice into the grain. As the grain starts to fill the shellac content in the rubber is reduced by only refilling with alcohol.

## 2. Bodying

Most of the film thickness or body is now built up. When finishing many people think in terms of how many coats are needed. With French polishing it's best to think in terms of a build or film thickness.

Timber varies greatly – the depth and number of pores may change across the surface of a single board. Due to this it is difficult to give precise ratios of shellac, alcohol and pumice. Very soft and open grained timbers like cedar will readily absorb a heavy cut of polish (remember, the cut is the ratio of dry shellac to alcohol), while harder fine grain timbers will absorb a lot less.

Paraffin oil is now introduced; not a constituent but rather as a lubricant after the grinding stage when it becomes harder to move the rubber across the flattened surface. To avoid problems, only small amounts are applied so the oil stays on top of the finish and doesn't penetrate into the wood. Three or four drops are all that's needed to get the rubber moving freely.


At this stage a 50/50 ratio of two pound cut shellac is fed into the rubber (roughly one teaspoon of polish and alcohol). A 3-inch circular motion is used to move across the surface, overlapping the circles with each pass (double up on the edges).

You may need to go over the whole surface many times to obtain the required build. During this stage a pattern of circles can start to emerge due to the repetition and repeated passes of the rubber. If the rubber is overloaded with polish this circular pattern or ropiness can appear and be difficult to remove later on.

## 3. Straightening, pulling over

This is a transitional stage between bodying and spiriting off. Roughly halfway through the bodying, the cut of the shellac starts to be gradually reduced (more alcohol to less shellac). The tight circular motion of the rubber is gradually drawn out into increasingly larger elongated ovals. This is done slowly over perhaps a couple of hours (depending on the piece you are working on), until the ovals extend the full length of the piece being polished.

The ovals become long figure-of-eights and then straight passes. The whole point of this stage is to slowly stretch out the tight circles while gradually decreasing the amount of shellac in the rubber. A firm pressure is now needed to physically stretch out the surface. During the bodying and straightening stages small amounts of oil are added only when needed. The use of oil is slowly tapered off towards the end of this stage.

## Spiriting off

A separate rubber with a clean cover is kept exclusively for this final stage and only contains alcohol. Any residual oil is now removed from the surface. The rubber should just glide across the surface; very little downward pressure is required. A perfect full finish with depth and clarity should now emerge straight off the rubber.

## Just get started!

French polish can seem daunting to the beginner and although it takes years to master I still encourage you to have a go. I like to start students on a panel around 600 x 300mm. You can secure it to your workbench with blue tack. Begin by just playing around with the shellac, watching closely how it flows and dries. Don't be afraid to wash it off and start again or cut back the surface between sessions if need be with abrasives (industrial scouring pads, 400 grit sandpaper or Tripoli powder and 0000 steel wool lubricated with white spirit). A large part of learning how to polish is understanding different solvents and how they work. Ultimately, it's all about experimenting and enjoying the process.

*See Frank van Brunschot demonstrate some of the techniques he discusses above on Wood Review's YouTube channel.*

*Note: always ensure adequate ventilation when finishing.*

*Photos: Linda Nathan*

*Frank van Brunschot is a furniture maker, restorer and finisher who also teaches woodwork and polishing from his Brisbane workshop. Email frank@frankvanbrunschot.com*

Stuart Lees in the workshop showing a Torque CNC machine mid-process.

# CNC For Small-Scale Use

**Stuart Lees introduces the first of a series of articles on choosing and using CNC machinery.**

Over the years, the rise of different forms of technology have seemingly threatened the continued existence of established practices, whether that was the certain destruction of painting and drawing by photography, the end of the music industry by the cassette tape, the movie industry by the internet, or traditional woodworking by CNC machines. Strange then that all these still co-exist. What's more each industry has profited from new technology, and art and craft practices have arguably done so as well.

I am no less guilty of expressing a concern but I am quickly coming around. The inclusion of a CNC router in my machinery line-up is proving to be a real asset. While I can do a lot of the functions that I am now getting the CNC to perform, these can be done faster and more accurately while I work something else. Rather than using the CNC router to completely build an object from start to finish (which isn't woodworking in my mind), I am finding having it as another tool at my disposal is proving particularly rewarding and opens up all sorts of designs and concepts.

So just what is this new technology, seemingly threatening the artisans of our craft? A CNC (computer numerically controlled) machine is one that is operated by a computer, following a program that positions the cutter in a 3D space.

CNC has been around for many years, but as the cost continues to drop, it's becoming more and more affordable for the average person. I am specifically referring to a CNC router and instead of handholding this router, moving in two dimensions (X and Y), and plunging it in the third (Z), it is secured in a holder with computer controlled stepper motors that are able to move it in each direction with incredible accuracy.

Taking it one step further, and considering that a router is really a rotating wood chisel that functions as a plane, saw and drill, you can start to understand just how versatile a CNC router really can be.

A basic CNC router can be purchased for under $2000, although at this price point, one that is particularly limited in capability and bed size. When the machines get to around $10k, they become exceptional performers, capable of high speeds and accuracy and having a larger bed size. If you want one that can handle a full 2400 x 1200 sheet, expect to pay upwards of $50,000!

That price still puts it out of reach of many that would be interested in tinkering with the CNC concept. For those who can see a revenue stream that helps offset the price, it is a different story altogether.

The range of movements the machine can make affects what can be produced. While there are a wide variety of sizes out there, a 600 x 900mm operating range is common, and suits the average workshop. While the distance between the main beam supports is a fixed dimension (Y axis), the X axis is not as limited, as you can index a longer board through the machine, working on it a section at a time.

While the CNC machine positions the router in 3D space, the router itself is just a glorified motor, designed to do one thing: hold, and spin the real tool at the right speed. The real tool in this case, is the router bit. It may be the smallest, cheapest, and most disposable component of the setup, yet it is the most critical. After all, it is the one part of the tool that actually contacts the material that is to be machined. Investing in quality bits provides the real versatility of the machine. With the right router bit, you can carve or cut, work with timber, aluminium, brass, plastic, even steel.

The sorts of jobs you can do on a CNC router are unlimited. Carving (V-carving, also referred to as 2.5D routing, such as signwriting), 3D carving of objects, 2D and 3D cutting and machining, and even working on a 4th axis that rotates the object under the router head, makes for a pretty mind blowing range of possibilities. I've only just scratched the surface of what I will be able to do with my CNC router – it is proving a fascinating machine to master.

A CNC router opens all sorts of doors for the small workshop. It has a reasonably small footprint, yet can produce some pretty impressive results. It is also a direction schools are starting to move to as well – bringing CNC routers into the classroom. Where a traditional workshop involves a large number of machines, space, dust, noise and risk in a student environment, these are largely addressed with a decent CNC router. Avoiding those models which bolt an existing commercial router to the platform; one that uses a spindle drive (air or water cooled) can run exceptionally quietly. With dust extraction and air filtration, and the physical degree of separation of student from the cutting zone while operating, even young students can be safely introduced (still supervised obviously) to this subtractive manufacturing process.

In future articles, we will review some of the more popular CNC routers that are currently on the market and delve further into some of the typical tasks these machines are used for.

*Photos: Stuart Lees*

*Stuart Lees is a woodworking enthusiast and authors one of the first (and largest) woodworking blogs in the world, Stu's Shed (stusshed.com). He has been an engineering officer in the Royal New Zealand Navy, and is currently a Facilities Manager at an Australian University.*

**Above:** A CNC example of 3D relief style carving.

**Left:** Model making is an ideal task for CNC machinery.


1

# The Collectors

**Wood Review readers and a few of our authors present some of the tools and machines they treasure.**

Understanding how and why things are made or originate, appreciating their function, design, looks, diversity, singularity and in some cases sheer quantity seem to be at the heart of what drives the people whose 'collections' are presented here.

Some like Trevor Semmens, Paul Brittan and Dick Lynch sensibly specialise in one type of hand tool. Fred Murrell, Ray Faull and Patt Gregory on the other hand collect all kinds.

Given Chris Vesper's status as a fine woodworking toolmaker it's understandable that dedication to his art and craft has driven a need to amass machinery, tools, books and more, but Chris's interest goes further as he studies the origins of machines and how advances in technology have affected our lives.

When however we look at the collections of Vince Manna we reach a whole new level that has been attained after 40 years of making, inventing and travelling. What is shown here represents only the tip of Vince's collecting iceberg, so next issue we'll show you another special part of his collection.

In the meantime, what follows is just a sample of some the tools that some people preserve and value.

*Linda Nathan, Editor*

1. A fine collection of Ibex thumb planes along with moulding plane blades for a No 55 Stanley plane found their way to be used on many exotic species of species of timbers. Amongst those collected by author are shown Mexican Kingwood, Honduras rosewood, Amboyna burl, thuya burl, and African pink ivorywood veneers.
2. Vince Manna's collection of timber species slowly approaches the 9,000 mark. Most of which he personally acquired from around the world over a 35 year period. 'One day I will use most of these rare exotics to create a floor that is a mosaic of the timber samples that I have collected during my travels.'
3. Vince Manna on one of his photography and collecting trips, here seen on one the floating islands in Lake Titicaca, Puno, Peru.
4. A vintage Rogers Mitre planer, Langdon Mitre Box Co. Miller Falls, Mass., sits on top of a rare block of thuya burl and end shooting a test piece of Colombian highly figured purpleheart.
5. A rare Wadkin universal woodworker's patternmakers vice specifically designed to securely hold irregularly shaped work. 'A great way to firmly hold large snakewood logs!', says Vince.

# Collector of Collections

*Vince Manna, craftsman, inventor, photographer, adventurer.*

My collections span over 40 years, and my passion and inspiration evolved literally from the stars. In my early teens, with a keen interest in astronomy came the reality of the unaffordability of much-needed telescopes. With a few old rusty hand tools and some waste timber at hand, this led me to make my own, each becoming more elaborate than the last.

Seeing the stars, the complex ring system of Saturn with its tiny moon Titan, and other heavenly bodies with the precision optical instruments that I made had a profound effect on me. My love for the natural world, combined with the immense diversity that woodworking represents, was the catalyst I needed to probe deeper and further, which ultimately led me to collect collections!

My collection has also been fuelled by my ancestors handing down tools from generation to generation for well over 150 years.

**Top:** Saws made by Simonds, top to bottom, No.361 straight back (showing unique blue etch), Bay State No.25 skewback, No.5 straight back (28"), No.62 skewback with blue enamel dollar medallion ($2.50 was the cost circa 1915 and is also etched into the saw plate), No.7 panel saw, No.97 back saw, assorted restoration tools.

**Above:** 'My temporary saw 'till' made from scrap materials holds around 36 saws. All are Simonds except for three back saws on the rear wall, one of which was my father's Thomas Turner (with the brass back). The three large mitre saws are all Simonds No.95. The 30" Simonds No.347 at the very bottom was their wood handled docking saw.'

## Every Saw is a User

*Paul Brittan, Qld*

My collection of handsaws has a threefold purpose. Firstly, I just love the look of a handsaw, particularly the full size saws; the intricate etches, the fine steel and the crafted handles all speak volumes. They also represent a pinnacle in cutting technology that was achieved in the early 20th century and never surpassed.

Secondly, I focus on Simonds saws, which are arguably as good as any and are also surrounded by mystique. There is little information about Simonds handsaws and I have made it my mission to investigate the mystery. After commencing handsaw production around 1901, Simonds ceased manufacture abruptly in 1926, yet achieved in 25 years a prominence in the American marketplace rivalled only by Disston and Atkins. I also collect a few examples from those two manufacturers, but those examples are strictly limited in view of my Simonds obsession!

Thirdly, these saws are just as useable today as they were when made around 100 years ago and as they become fully restored I do use them.

# Large and Small

*Chris Vesper, Toolmaker and Artificer, Somerville, Victoria*

My collecting and interests in life are many and varied. I have an interest in hand tools of all trades, and machine tools of all sorts but focusing on engineering and woodworking machinery.

Part of being a fine woodworking toolmaker is having the right surroundings for inspiration and reference and I find my collection provides that. Plus it's fun hunting for new finds! I have a preference for objects at either end of the size scale. Outlandishly large and ridiculous, through to super small mini sized items whether practical for use or not.

My favorite topic of study at the moment is industrial heritage and learning about the origins of machine tools and their particular designs and processes. I'm interested in advances in technology and how it affects human life. I try to see the transition of society and the manufacturing behind it that keeps us in the lifestyle to which we are accustomed.

Some of my work involves fine hand work and finishing and what better way to do this than with the perfect file for the job. My needle files and toolmaking files used to live in small drawers but they outgrew that recently. The 'file tree' shown was inspired ones I saw in my friend George Wilson's workshop in the USA.

And try squares: Who'd think I would be interested in them...? Well you know. The largest you can see in the photo is a 28" wooden patternmaking try square with a mortised lug to hold up the body; this has the largest traditional pattern rosewood try square sitting on that. Thereafter it's mostly engineering type squares up through the stack. Some of these are craftsman made and engraved beautifully with maker/owner marks, perhaps ex-defence workshop through the apprentice program decades ago — I will never know.

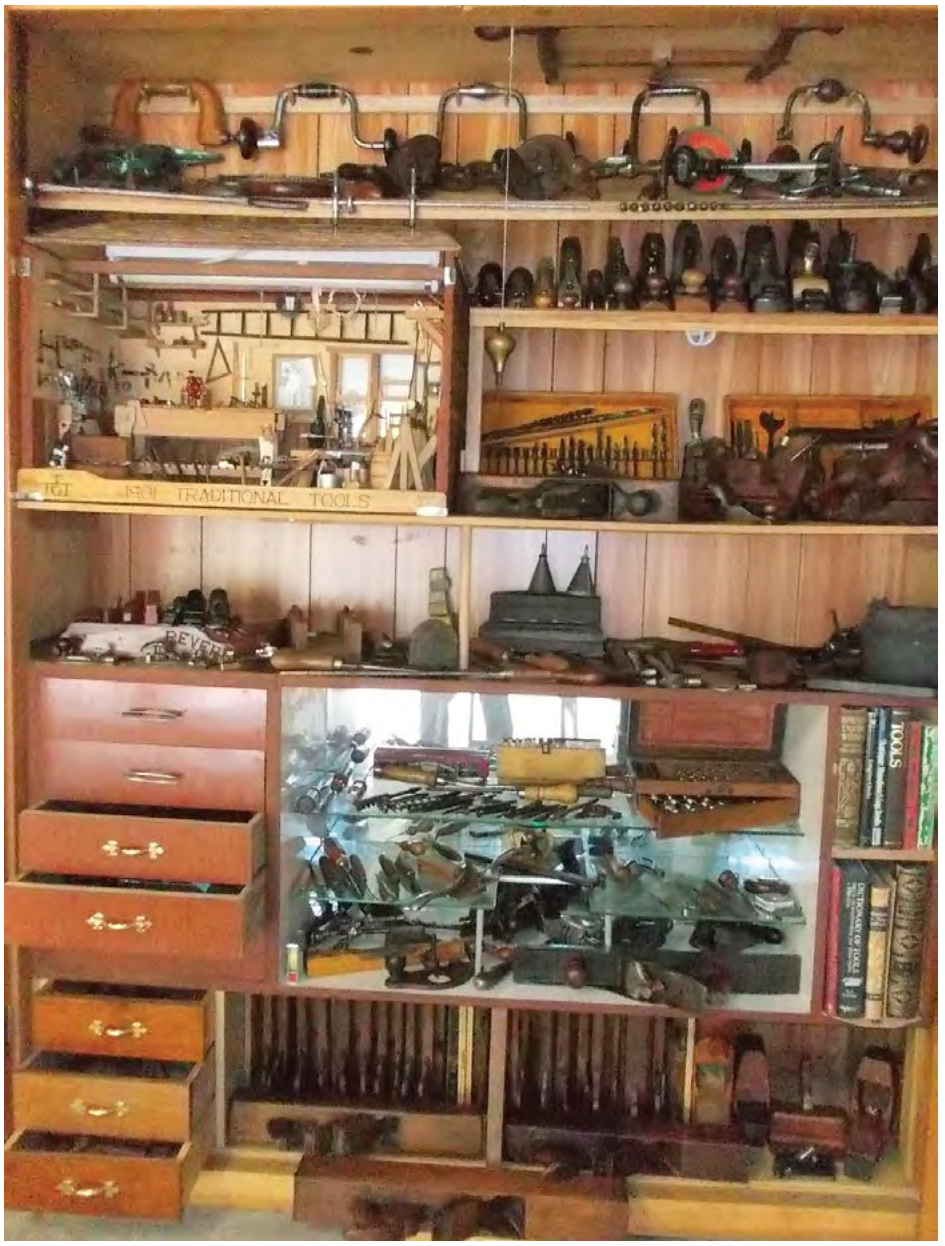
*Photos: Ken Payne*

**1.** On the large end of the scale Chris Vesper holds a large chisel called a slick, and a pair of stock shears. The latter is used by blacksmiths for cutting hot material; the strange looking bent foot goes in the hardy hole of the anvil. Behind that sits a 1250mm long jointer plane made from blackwood.

**2.** Try squares in a range of sizes and timbers.

**3.** My file tree conveniently stores files so the teeth don't touch.

**4.** In the centre are sugar nippers, a pre-1900 router bit that rotates and cuts either direction, some watch and clockmaking tools, miniature planes made from apple wood, a beautiful little hand vice and a very old nutcracker.




## Learn by Doing

*Ray Faull, Gosford, NSW*

At an early age, with a fascination for tools and making things, my collection began. By the age of 13 I had saved up (looking after chooks) to buy my wood lathe. Always I would buy a tool and do the job myself. So at 15, I built our family home. At high school, John Walton's text *Woodwork in Theory and Practice* illustrated tools I did not have so I acquired them to learn by doing. Then with realisation that old fashioned tools were disappearing, I kept acquiring. My collection looked sad just sitting on a shelf out of its context, so I made a scale model of the workshop they would have enjoyed in 1901.

**Above:** Ray Faull with some of this favourites. Tools in frequent use are kept in drawers and in closable cabinets that are near the workbench. 'My 63 year old wood lathe still does everything!'

**Left:** Storing older tools in a glassed cabinet keeps rust and dust to a minimum. The 1901 Federation scale model workshop can be seen on one of the shelves.


**Below:** The scorp (inset) is used for many trades.

**Bottom of page, left to right:** I made the pencil gauge in first year at high school during a couple of lunch hours. As you can see it has had lots of use and always brings back fond memories of that woodwork room; no co-incidence that I always enjoyed teaching woodwork myself.

My first plane, bought at the age of ten at Capper's Hardwood Store in Maitland for the princely sum of six shillings and six pence, is an Australian made No 10 Stanley.

My second plane, an English-made Stanley No 4-1/2 bench plane which I was fortunate enough to receive for my 14th birthday.

# Treasured Tools

*John Daniel, Traditional Trade Tools Group member, NSW*

This story is not about making a chair seat or for that matter a chair, it's about the satisfaction of using hand tools, it's about the tangible connection between the user and the project, to actually craft something rather than machining it up. True, in this commercial world of supply and demand, power tools and mechanisation is a reality, however in the home workshop it's both relaxing and satisfying to get back to the basics and occasionally take that cordless and dust-free hand tool out of the cupboard or tool box and put it to work.

When roughing wood down to size for a chair seat my Henry Boker German jack plane is always my tool of choice, and my scorp (made by W.E. Greaves & Sons, Sheaf Works, Sheffield) is irreplaceable then for hollowing. Needless to say that other hand tools are needed, such as a No. 5½ bench plane or similar that is used for finishing the flat surfaces and a custom made cabinet scraper (fashioned from a piece of an old handsaw blade) is ideal to remove the ridges left by the scorp, however it's the German jack and scorp that really connect, so basic but so efficient. As you can see, my tools have been well used and much valued; I recently re-finished the handle and knob on the No 5-1/2 to preserve it as the original finish had been deteriorating.

## Unconscious and Conscious Collecting

*Dick Lynch, Hand Tool Preservation Association Melbourne member, Vic*

I collect Titan chisels. Of the 1,500 or so possible combinations of sets, types, markings and styles so far I have 600. I was not always this focused.

I started unconsciously collecting tools when I was 16, whilst training as a cadet on BHP ships. On the recommendation of an old shipwright I cashed in my first Monthly Safety Bonus certificates for three Titan light socket chisels which I still have.

This unconscious collecting lasted 40 years across half a dozen workshops until my conscious collecting started a decade ago. My focus was Australian made tools until the last few years when I realised my collection was a mish-mash and other collectors were doing it better. I decided to collect Titan chisels exclusively. My collection has developed in a number of phases, the most significant being to acquire only 'collectable grade' examples that will eventually be antiques.

Today, the oldest Titan chisel is only 69 years old and they are classed as vintage (50 years old plus) and of course classic Australiana. I love them because they remind me of those halcyon days and were an integral part of most baby-boomers' kit.

## Time Tested

*Patt Gregory, teacher at Woodwork For Women, NSW*

I love my wooden marking and mortise gauges. It was over 30 years ago in Bristol, UK when I first used a mortise gauge (the second one from the right) when I was training as a carpenter joiner. Over the years I have collected different ones that came my way at garage sales or secondhand shops. Some are them are as old as 80 years. It gives me pleasure to think others before me have used them.

I found this tool tricky to use at first but once I'd mastered how to hold it correctly, it was a dream and I use it whenever I can. The rounded tops are the most comfortable to use and all of mine have steel pins rather than a cutting knife. My favourite is the oldest mortise gauge made of rosewood with brass inlay to keep it square and true (sixth from the left). These are beautiful little tools which don't seem to have changed their design for eons.

**Left:** Trevor Semmens with only part of his collection.

**Below:** A small range of Australian manufactured planes. Left front, McConnelll 1941 patent; left back, Bergs Jack, 1948 - 55, right front, Turner Block 1960–70; right centre, Carter 78 rebate, 1945–55; right back, Adept Aluminium, 1971–80.

**Bottom:** Showing the interesting variations of boxwood inserts attached to some plane soles.

# Handplane Historian

*Trevor Semmens, Rhykenologist, Tas*

A rhykenologist is one who collects, studies and preserves woodworking planes. My collection of woodworking planes really started out accidently in 1982 with the purchase of a trunk with some 30 planes. It currently stands at 1533. I also have hundreds of other woodworking tools and a comprehensive library of reference books. My collection is fully catalogued. To hold these tools in my hands is to feel and touch our history and enterprise.

Whilst I have planes from a number of countries, the oldest being a Dutch plane from about 1720, my main interest has been Australian made planes. In 1993 I wrote my first book about the Australian plane scene, *Australian Planemakers*. My purpose here was to inform, get feedback and, being self published, to cover my costs. I achieved this, which resulted in 1998 publishing *Australian Woodworking Planemakers, 2nd Edition*. An update to this 2nd edition was added in 2000. These books have become the definitive books on Australian woodworking planes.

As a collector I like to share my collection, and over the years I have given a number of talks and had displays at various locations.

**Above left:** The small dovetail saw shown was made in the late 18th century by Mitchell of London – see the long handle spurs and the shapely comfortable grip.

**Top:** I have a passion for correcting the abuse of a good tool where I am able. It offends me to see a 1930s 1-1/2" Ward paring chisel with a piece of water pipe as a handle and bits broken off the blade from being used as a paint tin opener. The chisel in question is shown, and now has a queen ebony handle.

**Above right:** One of my favourite tools is this crown moulding plane by Varvill & Sons of York. Measuring 3-1/2" across and it would have been used to create a fancy moulding on the top edge of a skirting or to the edge of a cornice. The longer of the two lines seen on the toe of the plane should be horizontal with the board flat on the bench suggesting that it would be held and operated at an angle of about 70°. These planes were made up to 150mm (6") wide and usually had a hole about 20mm (3/4") drilled through the stock about 20mm back from the toe and down about the same distance from the top.
A rope could then be put through the hole and around the waist of the apprentice who would walk backwards drawing the plane through the wood so the senior man could control the cut without the need to force the plane through the timber, bearing in mind that a complex 150mm plane might produce a shaving that is 200mm wide and there may be a need for 10 or more lots of moulding five metres long.

## How Things Are Made

*Fred Murrell, Traditional Trade Tools Group member, NSW*

What drives a tool collector to get out of bed at 4am to go to a swap meet in search of something that someone is only too pleased to get rid of? Good question and one that I pondered on many years ago when at a friend's home for dinner I produced a four-fold two foot ivory rule I had taken at the request of the host, when another guest remarked that it was quite beautiful, but asked why anyone would wish to own it. My answer, in the form of a question, was, why does anyone collect stamps?
I received no reply.

What created my interest in collecting tools was my natural interest in how things were made yesterday and are made now. The 150 years from the beginning of the 18th century was a period when toolmakers, vying for a better market share, not only made their tools to be as efficient as they could but made them attractive and comfortable to hold and use. I never cease to marvel at the effort that used to be made to design a hand tool that was not only efficient but pleasant to look at and use.

## Art and Function

*Charles Mak, Alberta Canada*

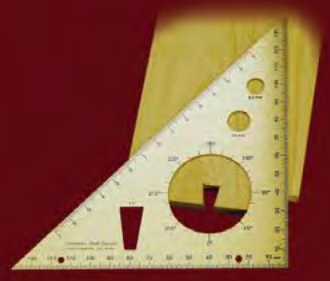
Dancing leg or master calipers were handmade by their owners mostly in the 18th and 19th centuries as a measuring tool. Some look at them as folk art and hence collector pieces.

I first came to know about this antique but whimsy workshop tool from The Art of Fine Tools by Sandor Nagyszalancy.
I was immediately drawn to its artful characteristic as well as functional value as a measuring tool. Depending on the age and rarity, they can cost from under a $100US to close to a thousand dollars apiece. I have built up my collection mainly through online auctions or antique shops.

Some of them are too rare or delicate to be used, so I built a display case to house them. I do keep a pair or two in the workshop and using them gives me the feeling that the tool has been given a second life. The case of fancy calipers never fails to attract questions or a conversation from a visitor who notices its presence for the first time.

RULE, SET, MARK & SQUARE WITH THE

# MULTI SQUARE



MARK OUT DOVETAILS

CHECK YOUR JOINTS ARE SQUARE

SET PLANER FENCES AT 90º

USE FOR GENERAL RULING

SET DEPTH OF ROUTER CUTTERS

USE THE PROTRACTOR TO SET BEVELS

USE AS A CENTRE RULER

SET DROP SAWS TO 45º AND 90º

ALIGN DRILL BITS

CHECK DOWELS OF SIZES 9.5 AND 12MM

- made from solid 1.6mm brass
- photo-chemically etched markings
- polished with lacquer on both sides
- dowel diameters gauge 9.5 and 12mm
- 140mm ruler horizontal and vertical
- main angle milled to exactly 90°
- certified accurate to ±0.05mm
- precision CNC milled
- 0-70mm centre ruler
- dovetail marker at 1:7
- mitre milled to 45°
- 360° protractor
- made in Australia

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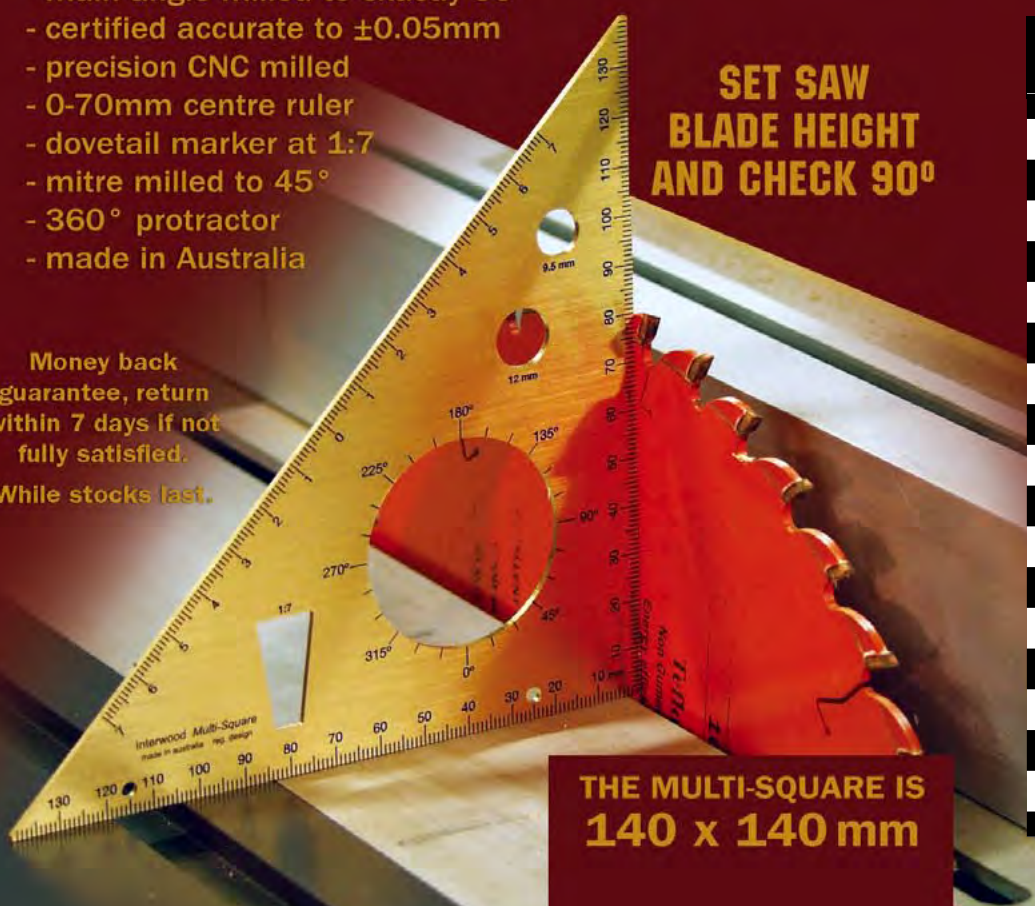
SET SAW BLADE HEIGHT AND CHECK 90º

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# Reading the Grain

**Understanding grain will allow you to avoid tearout and get better results. Robert Howard explains.**


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An understanding of grain is fundamental to working wood, but there seems to be a fair degree of ignorance and confusion about exactly what grain is. The most common example of this is the statement 'Look at the wonderful grain in that piece of wood'. More often than not, what we are being asked to look at is not grain at all, but figure.

## Grain and figure

In terms of woodworking, grain generally refers to the direction of wood fibres, so we can tell if we are cutting with or against the grain. A common analogy is animal fur, and the difference felt when you stroke one way or the other.

There are many other ways the term grain is used (endgrain, long grain, open and coarse grain, and so on) but I am only interested here in how it affects us when we want to cut wood. A full discussion of the broader field can be found in Bruce Hoadley's *Understanding Wood*, a must-have book for any serious woodworker.

Before cutting a piece of wood, we need to try to determine the direction of the grain, or in other words, the way the fibres are lying in the wood, so we can cut 'with the grain'. In many woods, any attempt to cut against the grain will result in tear-out (**photo 1**). It is here that confusing figure and grain will often lead us astray (**photo 2**).

## So what is figure?

Figure is the look of a wood surface, but mostly describes those that are unusually distinctive or beautiful. In its most mundane form it usually describes the pattern made by the growth rings of the tree. Because trees do not grow as perfect cylindrical forms, and the form of their growth rings varies even more, when a saw cuts a flat plane through the log, this plane intersects with the growth rings in unique and often distinctive ways.


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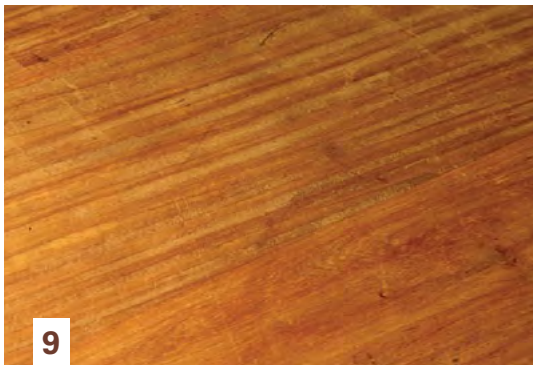
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**Photo 3** shows how you can trace the edge of a growth ring around a board. The way we break logs down determines the patterns the growth rings form on the faces of the cut wood. There are two pure forms of cut we can make. A radial or quarter cut is where the saw passes through the centre or pith of the log radially all the way along its length (**photo 4**). The other is to cut on the tangential plane (**photo 5**), where the cut is tangential to the growth ring (usually known as flat or backsawn), again all the way along its length.

Each of these cuts gives a distinctive form of figure on the cut surface. These can be further enhanced by the colour of the wood, particularly by differences in colour between the early and late growth rings, and the size of the medullary rays (most dramatically with quarter or radially sawn woods such as silky oak species).

None of the figure considered so far depends on grain direction. However, there are some cases where the figure is dramatically enhanced by what is happening to the grain. Burl, fiddleback, quilted, blister, bird's eye and curly figure are all caused by local changes in the grain direction that result in the light reflecting differently off the wood, depending on the angle at which we see it (**photo 6**).

In fiddleback figure (**photo 7**), the grain runs in waves along the length of the wood, causing periodic alternations in the direction of the grain (**photo 8**). More often, however, the periodic alterations occur across the width of the wood (**photo 9**). This happens when the longitudinal grain (because of some sort of genetic switch), starts to spiral up or down the tree.

Anyone who has spent time at the firewood pile with an axe, will be painfully aware of the consequences of this. This wood simply will not split across the growth rings (**photo 10**). Turn it 90°, however, and it springs apart along the rings without a problem. This wood is known as interlocked, and when cut radially produces ribbon or stripe figure. This is very common in Australian hardwoods. It can occur in combination with wavy grain (**photo 11**), in which case it can produce roe, broken stripe, or mottled figure, depending on which one predominates.

While grain direction changes can produce stunning figure, in general figure does not depend on grain. Rather, it is caused by the particular way the growth rings of the tree intersect with the plane of the wood surface. Grain is responsible for some figure, but not all figure is caused by grain.

1. Tear-out on fiddleback blackwood board. This fiddleback figure is caused by wavy grain running down the length of the board.
2. Figure caused by the growth rings in a red cedar board. If you wanted to plane the top edge of the board, the figure suggests planing from right to left. The grain, however, actually runs from left to right.
3. Here the growth rings on the endgrain continue out onto the face grain and then back to the endgrain. The patterns happened because the cuts were not made parallel to the top surface of the log, probably because the log tapered from end to end.
4. Quartersawn figure, where the growth rings run almost perpendicular to the face of the board of camphor laurel.
5. Backsawn or crown cut figure, where the growth rings are tangential to the face surface of the board.
6. When a board contains both fiddleback and interlocked grain, the two produce a more complex figure.
7. Tight fiddleback in a blackwood board.
8. The edge of a quartersawn board of *Toona calantas*, showing the pores and the growth rings in lockstep. This is true on any quartersawn surface.
9. Interlocked grain on the face of a quartersawn board of New Guinea rosewood in my workbench. The grain direction reverses from one stripe to the next all the way across.


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**10.** Interlocked grain in a piece of ironbark from the firewood pile.

**11.** The rear of the same piece of ironbark, showing fiddleback as well as interlock. Note how the wood has split cleanly along this surface.

**12.** The dark lines are the growth rings. The smaller black dashes are pores that have been split by the saw and show the grain direction whereas the growth rings do not.

**13.** Resin canals on the edge of a block of radiata pine can be used to read the grain direction.

**14.** Resin canals on the face of the same block can also be used to read grain direction.

**15.** The length of a pore cut by the saw varies from full length when it runs parallel to the surface, to a dot when it is vertical to the surface, so variation in the length across a board reflects the variation in grain direction.

**16.** A quickly made grain scribe with a sharpened nail is on the end.

**17.** The line left by the nail of the wood scribe follows the grain on a short piece of pine.

## Reading grain direction

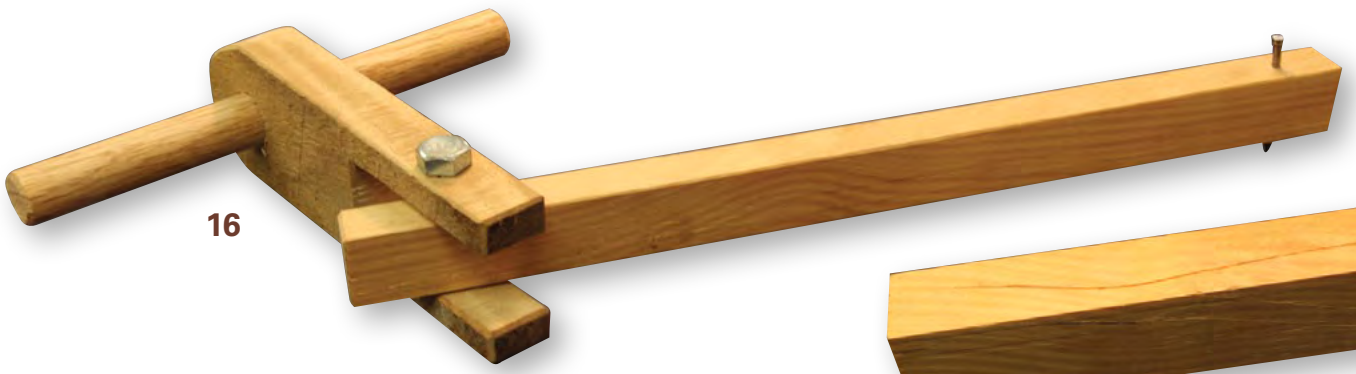
Reading grain direction is generally easier with woods that botanists classify as hardwoods. These are from trees that flower, whose seeds are contained in a fruit, and whose wood contains pores. Pores are vessels of varying size that run longitudinally in the tree, and many are split when the log is sawn. Split pores lie on the longitudinal surfaces of the boards, and many are easily seen with the naked eye (**photo 12**).

Softwoods (in botanical terms, the conifers) have no pores, but many have resin canals (the pines, spruce, larch and Douglas-fir species). In the pines these can usually be seen by the naked eye (**photos 13, 14**).

Both the pores (in hardwoods) and the resin canals (in some softwoods) lie along the grain and can therefore be used to indicate the grain direction. When planing the surface of a board we look at its edge to determine grain direction on the face, and vice versa. For many boards this will work well, except where bends in the growing tree cause the grain to flow in and out. Here we may need to plane in one direction for part of the board, and to reverse for other parts.

If the grain direction reverses too many times in a short distance (**photo 15**), it becomes inefficient to keep changing the cutting direction and we are in the same situation as with fiddleback grain. Interlocked grain presents a similar situation on quarter or radially sawn faces. Here the narrow strips of grain run in opposite directions (**photo 9**), and have to be planed at the same time no matter which direction we choose to work in. In all these cases we will always be cutting against the grain some of the time.

To reduce or eliminate tear-out here we can use a normal plane with very sharp blade, a closed up throat, and a fine cut; or we can opt to use a high angle plane (either a normal plane with a high angle frog, for example, or a low angle, bevel up plane with the blade sharpened at an angle between 40 and 50°).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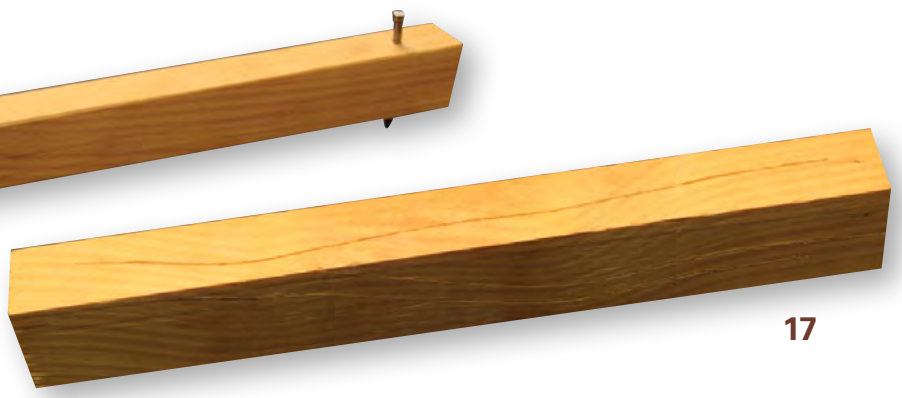
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**18.** One corner shows the grain running in the same direction on adjacent face and edge of board.

**19.** The other corner has grain running in opposite directions on adjacent face and edge of board.

**20.** The bottom red pencil shows the grain direction in the top surface of this board.

**21.** The right hand red pencil shows the grain direction in the edge of the board.

**22.** The yellow pencil shows the combined direction of the two red pencils.

## Grain scribing

If we cannot read the grain using the pores or resin canals, we can always use the old suck-it-and-see method, where we simply take a cut and see what happens. Or, we can make ourselves a simple grain scribing tool, as shown opposite below in **photo 16**.

This has a sharpened nail in the end of a trailing arm attached to a handle by a vertical pin. If we place the nail on the wood under a little pressure and pull on it, the nail will scratch a line along the wood following the grain (**photo 17**). A few hours spent with this, experimenting with a wide a variety of woods will probably teach you more about reading grain than words and photos ever will.

## The third dimension

Most cabinetmaking operations are basically two-dimensional. We read the grain on one edge of a board and work usually at right angles to it. But sometimes we need to work in three dimensions, as a carver routinely does, and that changes things dramatically.

A simple example is where we need to plane a small chamfer on a corner, or a small round-over. On the edge the grain on horizontal and vertical surfaces runs in the same direction (**photo 18**), so planing the chamfer is easy and problem free. But on the other side (**photo 19**), the grain runs in opposite directions on the adjoining faces. How do we deal with this?

When we need to plane in one direction and then the other for reversing grain, there is always a tricky point just where the two meet. If we go too far in either direction, we will get tear-out. The same thing happens when we carve, only this time the tricky point happens when our cut on the chamfer or round-over passes a critical angle. This is when the dominant grain transitions from one face to the other, and where we need to begin planing in the other direction. Or switch to using a high angle plane.

A good way to understand what is happening to the grain here is to place a pencil on one face of the board along the grain direction, as shown by the pores or resin canals (**photo 20**). Now look for the grain direction in the adjoining face of the board (**photo 21**), and move the pencil (while maintaining the first angle) to indicate this second direction. The position of the pencil (**photo 22**) shows the way the fibres are lying in the board.
If the angle of the grain direction is similar in each face, the transition line will be around the 45° mark. If the angles are different, the grain direction indicated by the larger one will dominate until, when the smaller angle approaches zero, we are back to having only one grain direction to worry about.

## Grain for carvers

Woodcarvers face a unique situation that does not usually confront furniture makers. This occurs because most carving is done with curved blades, or gouges.

If we take a straight grained piece of wood, this is most easily shown when we make any cut diagonally across the surface, as shown in **photo 23**. At any midway point the gouge is simultaneously contending with three different grain directions and two transition lines.

To best see this, imagine the cut as rectangular in cross section (**photo 24**). Here we can easily see the three major surfaces of the cut, two vertical and one horizontal. The best we can hope to do

is to get the direction of the grain to go in the same general direction in the horizontal surface and one of the vertical surfaces. No matter what we try, we will always have to cut against the grain on the other vertical surface. The only way to avoid this when making a single cut is to carve either up and down the board (provided the wood does not have interlocked grain) or preferably across it (where we are working independent of grain direction).

This is fundamental to woodcarving and one of the major learning curves facing the beginner. Fortunately, when carving there is usually a waste side to most cuts so you learn to cut so the against-the-grain side is in the waste. If you can't you can begin with a small cut (with a sharp tool) in a safe area, and then enlarge this from both sides with cuts in the direction of the grain.

When carving a doughnut shape as in **photo 25**, we can see how the direction of the cuts in each quadrant of the circle reverses as we move from carving the outside shape to the inside.

This situation gets particularly tricky when you start working more complex surfaces, such as the compound curves on the inside of a bowl (**photo 26**). Even for a simple cut straight down the inside of the bowl to the bottom centre, the grain direction on each side of the cut changes as you move from the 12 o'clock to the 3 o'clock to the 6 to the 9 to the 12 o'clock positions relative to the grain. We can see that it's not an exaggeration to say that carving is dominated by considerations of grain direction.

However, it is not just tear-out that the carver has to avoid. It can generally be dealt by watching what is happening as you cut, and simply change direction when the tear-out occurs. A more difficult problem to correct can occur if the carving involves creating a sharp internal ridge. Many woods such as Huon pine can be excellent carving woods, but be weak in a short, cross-grain situation such as a ridge (**photo 27**).

This is dealt with by cutting each side of the ridge in the correct direction relative to the grain, otherwise the wood will crumble away along the top edge. The first cut is critical because it's the one that does much of the damage internally in the wood on the against-the-grain side, but this is not visible until the cut on the other side is later made.

There is a useful, general rule that carvers have evolved for relatively straight grained wood (which is preferred in most cases): when carving wood where the grain direction is horizontal, work from high to low with any cut; or, when the grain direction is vertical, work from low to high.

## Finally

We can fret endlessly about all the theory of grain direction, and how to read it, but when it comes down to actually cutting wood, the most important thing is to pay attention to what is happening at the cutting edge of your tool. If this contradicts what your theory reckons should be happening, ditch the theory and change the direction of your cut. In the end, what works is what is important. This is not to say that theory is irrelevant, just that sometimes we simply get it wrong. We can greatly reduce the chances of this happening if we get better at applying the theory to the many unique pieces of wood that we have the good fortune to work with.

*Photos: Robert Howard*

*Robert Howard is a woodworker and sculptor who lives in Brisbane. He teaches regular woodwork classes from his studio. Email: howardrobert@me.com*


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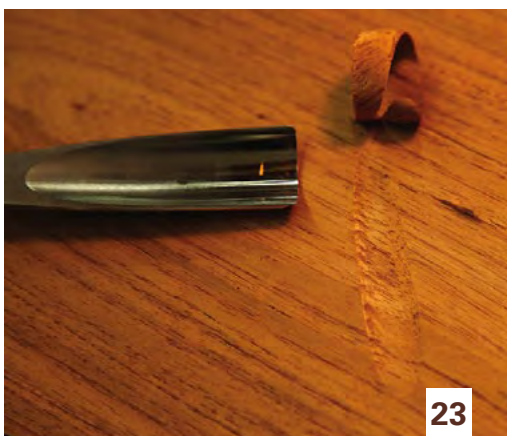
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**23.** Diagonal cut across the grain made with a shallow carving gouge. Note the differences in the left (against the grain) and right hand (with the grain) edges of the surface of the cut.

**24.** Grain direction on each side of a gouge cut can most easily be imagined by thinking of the cut as a trench.

**25.** Carving a donut into the face of a board. Grain direction of the outer and inner edges of the doughnut are as shown. All against the grain edges of the cuts are on the waste side.

**26.** Flutes carved into inside of a bowl. Grain direction can vary on each side of the flutes as they progress around the bowl, as well as from top to bottom.

**27.** The left ridge carved in the same direction on both sides, one with and one against the grain. The righthand ridge is cut with the grain on both sides.

# Heirloom Stool

**Richard Raffan recreates a piece of furniture that recalls his family history.**

When I was very small my father made me an oak stool, a four-legged version of the one in **photo 1**. I was assured that for a year or so I used it constantly as a table, seat, and climbing aid — as did my sister, three years behind me, and our brother a few years after that. Then for a couple of decades and before we produced the next generation, our mother used it as a low side table and occasional footstool. The stool is now with my sister and her grandchildren are using it. The stool my father made for me has now been in constant use for 70 years and used by four generations — it's become an heirloom. The surfaces of this simple project can be embellished with inlay, carving, or pyrography, or you can simply smother it with beads and coves. It's a piece of furniture useful at any stage of life.

The main reason for having three (rather than four) legs on a stool is that it will always stand firm on any surface, and there won't be a problem should the top warp slightly. The top is turned flat so it can support mugs, glasses, bottles of gin. The top can be anywhere between 230mm and 300mm diameter, so it's a project that can be done on a mini-lathe. Here you see a Vicmarc VL150 with a swing of 300mm. This project is a combination of facework and centrework and I turned it using only the three tools in **photo 2**: a 1/2" spindle gouge, a skewed 1" scraper, and a 1" skew chisel.

You turn the top first, drill the mortises/holes for the legs, and then turn the legs to fit the mortises. Once the stool is assembled the ends of the legs are trimmed so they sit flat on a floor rather than perch on a fragile edge.

## The blanks

The timber for this stool needs to be well seasoned. Preferably the blank for the top should be quartersawn (with the annular rings on the endgrain near 90° to the two faces); then if it does move it'll go oval rather than cup. These blanks were cut from a seasoned board of camphor laurel 40mm thick. A 50mm thick board would have allowed me some margin for error when turning the top. And I'd have preferred 50mm squares for the legs, which could then have been tapered like those on the shorter stool shown, but I used what I had readily available. I considered other timbers for the legs, but didn't care for the look of elm, silky oak, or casuarina alongside the camphor. Make sure the grain runs the length of each leg, as any cross-grain will weaken the leg.

## Turning the seat

The underneath of the seat is turned first incorporating some detail that can be gripped by a chuck. Then the job is remounted so the top can be completed. So as not to waste material I glued a waste block to what will be the top of the seat so the blank could be held on a screw chuck, **photo 4**.

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Two stools made by the author from camphor laurel, 285mm dia x 285mm high, and 285mm dia x 340mm high.

On a larger lathe you could forget waste blocks and mount the blank in large dovetail jaws or bowl jaws. An altogether different approach would be to put the blank straight on a screw chuck, then later turn the screw hole into a decorative hole through the centre of the seat, like a sort of doughnut or bagel.

**1. True the side.** Get into the habit of truing any blank and removing any features you don't want in your finished item. As I began to true the side a knot flew out leaving a less-than-attractive black cove. To avoid turning away more wood than required, I marked the lowest part of the defect (**photo 3**), then turned to that line. To avoid splintering the rims of the blank as you true the side, cut in from each face (**photo 4**). If you have the gouge bevel rubbing the wood and the tool pointing in the direction you're cutting, you should end up with a smooth and cleanly cut surface.

**2. Flatten the base.** This blank was cut from a planed board so the faces were almost parallel and little needed to be removed. In this situation I always opt for a skewed scraper that I can ease across the face to skim off thin shavings and dust (**photo 5**). The edge of the scraper is slightly radiused so only a small portion is in contact with the wood. I plant my hand on the left of the T-rest and that's where it stays as I hook the ends of my fingers over the blade so I can squeeze it towards my palm. Whenever you move your hand along the rest you lose a bit of control, so my left hand stays in one position per squeeze.

**3. Chamfer the rim.** The stool legs are splayed at about 10° off vertical and set at right-angles into a chamfer on the base. To lay out a 10° chamfer, measure 10mm up the side from the base and 65mm in from the rim (**photo 6**), then turn the chamfer between the two lines.


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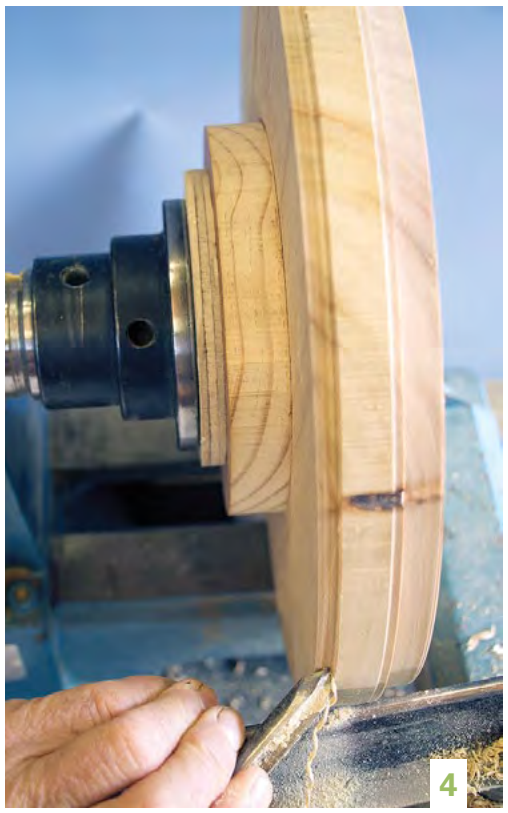
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Use a pull shear-cut to remove the bulk of the waste (**photo 7**), then a push-cut with the bevel rubbing the wood as in **photo 8**. A shear scraper using a skewed scraper (**photo 14**), is a good way to finish the chamfer if your gouge-work is a bit ridgy.

**4. Turn a fixing for the chuck.** You need a decorative tenon for a chuck to grip, or a recess for a chuck to expand within. The larger the diameter on which the chuck grips, the more secure the job, so I opt for a concave recess of about 107mm for my Vicmarc VM100 Step Jaws. The recess is hollowed with a gouge, then the corner is dovetailed to accept the chuck jaws using the long point of the skew chisel, **photo 9**. Keep the chisel flat on the rest to avoid a catch.

To disguise the fact that the recess is a fixing point, I'll round over the dovetail rim when sanding, and in the meantime add a wide bead by way of decoration.
To create a bead, turn a couple of grooves with convex sides (**photo 10**) by pivoting the point of a spindle gouge into the wood. Keep the gouge on its side with the flute facing towards the groove. If you roll the gouge over at the bottom of the groove, the upper wing is likely to catch and you might utter some naughty words. If you find turning the shoulders round too much of a challenge, sanding is a much simpler if less elegant solution.

**5. Sand and finish the recess** and the immediate surround that you cannot easily get at later.

**6. Lay out the leg positions.** When you lay out the positions for the legs, you need to know where centre is. You can leave a pencil dot at centre but it's looking a bit plain, so I opt for a couple of grooves surrounding a small cone. Ease the long point of the skew chisel into the wood, and keep the chisel flat on the rest to avoid a catch.

The tenon on the legs will be 35mm diameter, so I set the circle on which they will sit 25mm from the bottom of the chamfer (**photo 11**). Then use dividers set to the radius of the circle you've just marked to set out the position of the legs. A radius will divide the circumference of its circle roughly into six (**photo 12**), so the legs are placed on every other intersection. Avoid having two legs on or near the same growth ring in case this induces splitting later.


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**7. Remount the blank, flatten the top.** Before you can drill the mortises for the legs you need to flatten the top. Remove the waste block with a series of pull shear-cuts and push-cuts with the bevel rubbing the wood, similar to those in **photos 7** and **8** only with the push-cut working towards centre.

Check that the top is flat by holding a straightedge against the spinning wood (**photo 13**). High spots will be burnished and usually obvious as at 230/50, but you can also highlight them with a pencil. For a very smooth surface and less aggressive cut, tilt the skewed scraper on edge and stroke away the high spots using the lower half of the edge, **photo 14**.

**8. Drill the mortises for the legs.** I do a lot by eye, but drilling the legs freehand is a bit too loose even for me. Much safer is to make a simple jig (**photo 15**), that presents the chamfer on the underside of the seat at right-angles to the drill bit. This is clamped to a drill press. The two pins support the seat; the line between the pins is bisected at right angles by a line that can be aligned with the drill.

When you have positioned and clamped the jig in position, set the depth stop so the drill stops at least 3mm short of the jig. Then drill the mortises (**photo 16**).

**9. Remount the seat for sanding and finishing.** To maintain a flat surface on the top, use a sanding block (**photo 17**), and sand as little as possible so as to avoid a hump developing at centre. It helps to stop the lathe and push the block across centre a number of times, revolving the job a few degrees between each push. I finished this stool, as I do almost everything, with a mix of boiled linseed oil and beeswax, first slopping on oil to fill the grain, then melting the beeswax into the wood on top of the oil.

## Turning the legs

These blanks were barely 40mm square and I need to keep them as large a diameter as possible, partly for aesthetics and partly for strength.

**1. Turn a tenon to fit the mortises.** More accurate than calipers is a gauge made using the same drill as that used for the mortises (**photo 18**). A wide gauge makes turning a cylindrical tenon easier.


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For a really tight fit, when the tenon is almost down to size put a slight chamfer on the end and test the fit in the stool mortise. Twisting the leg in the mortise will create a burnish mark, and that indicates the exact fit. With the leg back on the lathe, turn the tenon down to the burnish mark (**photo 19**).

To ensure the leg is seated right into the mortise when I assemble the stool I put a groove on the tenon just short of the mortise depth (**photo 20**). This will vanish into the mortise when the leg is in as far as it should be. The other groove is decoration.

**2. Finish turning the leg.** A skew chisel should do the best job and for cylinders and long coves I use mine long point down (**photo 21**). All I can manage on these legs is a slight narrowing two-thirds down from the seat. On 50mm diameter legs I'd have included a bead and more dramatic shape similar to those on the jarrah stool to the right on p.74.

**3. Sand and polish the leg up to the tenon.** You don't want wax or oil where there will be glue.

**4. Scratch a groove in the tenon** (**photo 22**) so there's an escape route for air compressed when the leg is pushed into its mortise.

## Assembly and levelling

When you come to assembling the stool, smear a good quality wood adhesive around the mortise and drive in the legs until the mortise groove disappears. If you have an air groove, compressed air shouldn't pop the leg out. Nevertheless it pays to put the stool on a flat surface with some weight on top to ensure the legs stay where they should be.

The final task is to level the bottom of the legs so they sit flat on the floor — at this stage they rest on a small portion of the rim, and that's guaranteed to split away sooner or later. Set the stool on a flat surface and use a pencil to draw around the leg, creating a line that's parallel to the flat surface (**photo 23**). Then cut the end of the leg back to this line. I find a disk sander offers the most control (**photo 24**), and it enables me to leave the bottom of each leg slightly domed so the stool is easy to slide across a pile carpet or tiles.

*Richard Raffan is a woodturner and author who lives in Canberra.*
*See www.richardraffan.com*

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# Frame and Panel By Hand

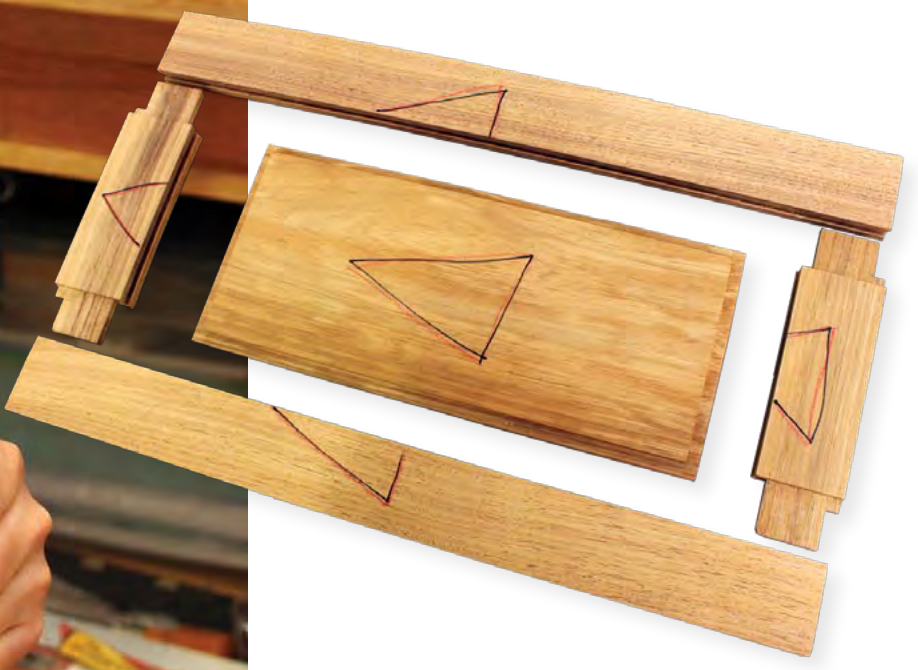
**For smaller jobs, here's a simple method that allows you to work largely unplugged. Story by Damion Fauser.**

Frame and panel is one of the most commonly used construction methods that allows for the seasonal dimensional change that timber undergoes. It's common to use machinery for creating these joins however I've developed my own process (post initial milling of stock) that involves just a few simple hand tools.

This is not a method for fast-paced full-time joinery shops. But for small jobs, such as a cabinet with one or two doors, or the rear panel assembly of a cabinet, or if you like working without earplugs on, then this could be for you. I use it whenever I'm not under intense time pressure and I feel like easing back on the throttle a little.

## Overview

Apart from the usual hand tools you'll need a tongue and groove, rebate and router plane (*ct'd p.82*).



**Left:** The author using a tongue and groove plane. The shavings shows just how rapidly stock can be removed with these tools.

**Above:** Use of a cabinetmaker's triangle or some other form of reference is essential.

# Tongue and Groove Planes

Also known as match planes because they joint boards to form wider panels, tongue and groove planes are unique joinery tools. There is a blade either side of a carefully machined or cast guide in the body of the tool and a pivoting, off-centred fence.

In the first setting, one blade is exposed and the fence is positioned to centre it on the width of the stock to cut the groove. Pivot the fence around and both blades are exposed and positioned to cut away a third of the material from either edge, forming the tongue. The resulting tongue slots into the groove and the two boards are seamlessly joined together.

Traditionally the two blades were separate edge tools, independent of each other and requiring individual placement and setting. The downside here is that the depth of each blade must be set precisely the same. The advantage is that these traditional tools come with blades of varying widths, allowing the use of stock other than 1/2" or 3/4".

Lie-Nielsen manufactures a modern version of the Stanley No 48 (for 3/4" stock) and the No 49 (for 1/2" stock) and their blades are a single forked assembly that sits on a specially cast body to ensure proper alignment. Treat the blade as you would any other chisel or plane blade for sharpening. Give it the full treatment by lapping and polishing the back and polishing a micro-bevel and this tool will perform well even in unruly woods.

Like other joinery planes, I find the front handle to be more of a hindrance than a help. I get far more accurate results by placing my front hand lower down on the tool, with my thumb riding on the top of the casting and my fingers wrapped underneath to apply gentle pressure to keep the fence registered against the workpiece.

Whilst a tool designed for rapid stock removal and with integral fence and depth stop, this is still a handplane and you must commence the cut with pressure at the toe and end the cut with pressure at the heel to ensure consistent results.

Finally, as this tool cuts a shaped profile, I treat it as I do a moulding plane and therefore start the cut at the far end of the workpiece, taking a first pass of about 150mm. Move back towards the front end, take a second longer pass of 300mm and so on until you are running the full length of your workpiece.

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**1**. The one-piece blade Lie Nielsen is easier to set than the two Stanley blades.

**2**. Detail of Lie-Nielsen plane base.

**3.** Old and new models. Stanley and Lie-Nielsen No 48 tongue and groove planes.

**4.** Close-up of running the groove in a stile.

**5**. The tongue is run on the alternate fence setting.


A


B


C

The tongue and groove plane cuts grooves in the frame components. The walls of the grooves in the stiles serve as a reference point for the face of your chisel when cleaning out the mortises.

After running the grooves, switch the fence setting on the tongue and groove plane and run the matching tongues on the long grain sides of your panel. Switch to the rebate plane to cut a rebate on each face of the panel ends using the long grain tongues as a visual reference for your cutting depth.

This is the one time I cut the long grain of a profile prior to cutting across the grain, but with sharp tools I don't get any breakout issues and I like the convenience of the long grain tongue as a visual depth stop. Lay out and cut mortises in the stiles and haunched tenons on the rails and there you have it – frame and panel by hand.

## First the frame

**Prepare components.** Machine frame and panel components precisely to desired thickness. Cut to length but allow extra on the rails for the tenons. Stiles are also overlength at this stage as the 'ears' make disassembly after a test-fit much easier. This also lets you cut mortise ends closer to the final ends of the stiles without risk of breaking out the weaker short grain at the end of the mortise.

## For Best Results

**A. Starting a pass.** My elbows are locked and my right arm is directly in line with the tool and the direction of the cut. Here I am applying pressure on the toe of the tool to commence the cut.

**B. Mid-pass.** Pressure is being applied to both the toe and the heel now, my arms are still locked and I'm using my legs and body mass for forward momentum.

**C. Completing a pass.** Body position remains the same but I am now applying pressure to the heel of the tool and ensuring I fully exit the tool from the cut before lifting the tool away from the work.

Don't cut to width just yet. Because the fence on the tongue and groove plane protrudes below the sole of the plane, you will need additional width for securing in the vice. Once the profile is run, rip to width on the tablesaw.

Because the tongue and groove plane rides on its integral fence, careful use of reference surfaces is essential. Lay frame components out and mark triangles on one face only as shown on p.80 on the almost completed construction. Always ensure the plane rides on the marked faces. If you don't, any jointing errors will be doubled when assembling.

**Run the grooves.** First take a few light passes to establish the run of the groove. This will also help if you happen to be going against the grain. Although you have a fence to guide you, this tool will follow the grain if you allow it, so you need to get the first few passes just right. Also concentrate on keeping the tool plumb. After the groove is well established, remember the tongue and groove plane is a rapid stock-removal tool and you can take a decent bite with each pass.

Make sure you exit the groove fully before lifting the plane away or you'll risk damaging the end area. Use your body mass and legs as the primary force behind each pass and lock your arms to maintain control of the tool. Once you get into a routine you can remove material surprisingly quickly. Continue until the shavings stop — the sole of the tool serves as a depth stop.

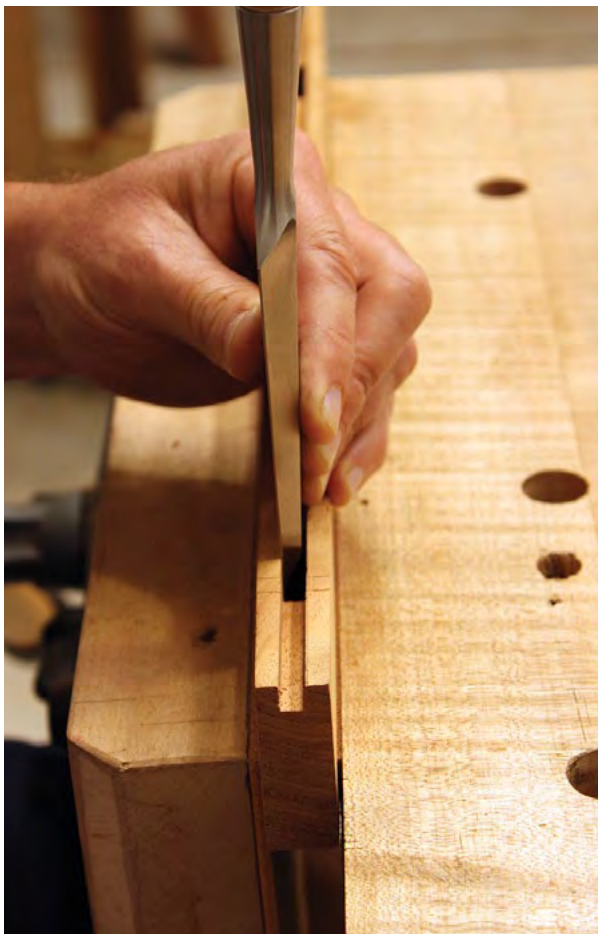
**Establish stile length and rail width.** Mark the desired length on the stiles, adding 1–2mm to allow for trimming to fit after assembly. To establish rail width on the stiles lay a rail across a stile right at the scribe line and make a tick mark with your knife on the opposite side of the rail. Square these marks around to the inside face of the stiles and measure in 5–6mm from each mark to show mortise lengths.

**Cut the mortises.** The grooves will determine the thickness of your mortises, as well as the tenons on the rails, because the groove is cut at one-third the thickness of your frame stock. Cut the mortises using your preferred method. At present I drill out the waste with a forstner bit and clean up with chisels. The inner groove walls serve as a fantastic vertical and flat surface from which to reference the face of your chisel.

**Mark and cut tenons.** To lay out the tenons on the rails first establish the length required between the stiles and scribe the shoulders accordingly. Then lay the end of a rail against the scribe lines of a stile and transfer the inside end of the mortise and the frame length to establish the width of the tenon.

**Take a gauge and set it to scribe a line** that's a whisker outside the inside walls of the groove. Remove the waste to establish the cheeks of the tenons. Given the symmetrical nature of this joint I use router plane to trim the tenon cheeks. This tool not only perfectly centres the tenon on the rail, it ensures the cheeks are co-planar with the faces of the rail which is essential to keeping your final assembly flat.

**Lay out and cut a haunch on the tenons** to fill the gap left by the fact that your grooves extend to the ends of the stiles. The depth of the groove establishes the length of the haunch, and the distance you measured in



**Above:** Using a router plane to trim the tenon cheeks.

**Left:** The inside walls of the groove act as a reference for the chisel when cleaning out the mortise.

**Clockwise from above:** Cutting the rebates with a Veritas skew rebate plane. Keep elbows locked and right arm in line with the tool.

Same process of rebating but seen from the other side.

Test assembly. Spacer shims are used to keep a consistent reveal between the panel and the frame.

from the end of your stile to establish your mortise establishes the width. I reference mine directly off the stile grooves to ensure I'm working to reality. Saw away the waste to establish the haunch and then test-fit and pare to fit if required.

## Prepare the panel

Cut your panel remembering to add twice the depth of the grooves (in the case of the Lie-Nielsen No 48 plane for example that is 5/16") and then subtracting 1/8–1/4" to leave a small gap (1/16–1/8") at either side for dimensional change.

One limitation of this technique is that only smaller assemblies can be made, as there isn't enough room in the grooves for a larger panel to move. Using quartersawn stock helps, or you can make panels up from narrower boards. The widest I have made to date are 12" wide.

Switch the plane fence to the tongue setting and run the tongues on both of the long grain edges of the panel. Once again go lightly at the start, use your body mass and exit the tool carefully.

Once the long grain tongues are done, clamp the panel to your bench with the end hanging over. Set your rebate plane to cut a rebate that is as wide as the depth of cut on the tongue and groove plane. If desired, set the cut depth by laying the sole of the tool on the tongue and bringing the depth stop down to the face of the board. I don't bother with this as I use the long grain tongues as a visual reference to know when to stop cutting.

Set the nicker blades if you choose to and start planing. Establish the rebate on the first side, which forms half of the tongue, flip the panel and repeat for the other half. Repeat on the other end of the board.

To ease assembly and reduce the risk of breaking the walls of the stiles, I gently break the edges of the tongues with a block plane.

## Assembly and finishing

Mill some shims to the thickness of your reveal for use during assembly. After test-fitting remove the reference and machining marks with a handplane. It may pay to pre-finish the inside edges of your frame components and your panel. Get ready for glue up and assemble your piece, using the shims for the reveal.

After the glue has dried remove the clamps, then smooth any steps at the rail/stile intersection with handplanes or abrasives. Now it's just a matter of fitting the assembly to its intended space and completing any further work needed.

This is one of my favourite working techniques. For smaller jobs where you don't have time pressure, this technique will introduce you to some wonderful hand tools and improve your skills and confidence as a woodworker.

*Photos: Raf Nathan*

*Damion Fauser is a furniture designer/maker who lives in Brisbane. He teaches woodwork from his Darra workshop. Email: damion@damionfauser.com.au.*

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**Note:** Listings are correct at time of publication but may be subject to change. It is advisable to check details with the organiser before visiting.

### UNTIL JUNE 11
**The Memory Palace**
Survey exhibition of work by Helmut Lueckenhausen
The Warrnambool Art Gallery, Warrnambool, Vic
www.thewag.com.au

### 5–7 JUNE
**The Australian Woodturning Exhibition**
Waratah Room, Whitehorse Centre
397 Whitehorse Road, Nunawading
www.theaustralianwoodturningexhibition.net

### 6 JUNE
**Gippsland Woodcraft Group**
Annual Open Day, displays, demos and vintage cars
Clubrooms 843 Maffra/Rosedale Rd, Nambrok, Vic
Graeme Turner 03 5174 5368, 0437 510 950
**Tel:** Anthony 0413 022 113, Karen 0423 560 176

### 6 JUNE
**Woodturners Society of Queensland Inc**
Open Day, 9am–3pm
19 Pine Street, Greenslopes, Brisbane, Qld
**Email:** Brian Creese brian.creese@bigpond.com
**Tel:** 07 3378 4041

### 6–7 JUNE
**South Coast Regional Exhibition of Woodwork (SCREW)**
20th anniversary exhibition, demos, sales
Central Tilba, NSW
**Tel:** Eric Simes: 02 4473 9696
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### 12–14 JUNE
**Sydney Timber & Working With Wood Show**
Hall 6, Sydney Showground
Sydney Olympic Park, NSW
**Email:** info@iexh.com.au
impressiveexhibitions.com.au

### 20 JUNE
**Fine Woodworking Skills workshop**
The Traditional Tools Group
Brush Farm House, 19 Lawson St, Eastwood, NSW
www.tttg.org.au

### 21 JUNE
**Metalworking Skills for Woodworkers**
Hands-on bench and forge work
The Traditional Tools Group
Brush Farm House, 19 Lawson St, Eastwood, NSW
www.tttg.org.au

### 29 JUNE–3 JULY
**Winter School, Sturt School For Wood** including
Build a stool workshop with Phoebe Everill, and
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www.sturt.nsw.edu.au

### 5 JULY
**Saw Sharpening workshop**
The Traditional Tools Group
Brush Farm House, 19 Lawson St, Eastwood, NSW
www.tttg.org.au

### 9–12 JULY
**FURNITEXconnect**
Australian Furniture Association
Royal Exhibition Building, Carlton Gardens, Melbourne
www.australianfurniture.org.au/furnitex

### 11 JULY
**Open Day, Maryborough Woodworkers & Craftsmen Guild Inc**
Wood Pavillion, Maryborough Showgrounds
Allan Walker 07 4129 8913
Graeme Richter 0427 792 927
**Email:** marywoodies01@gmail.com

### 16–19 JULY
**Decor + Design 2015**
with Australian International Furniture Fair and VIVID
Melbourne Exhibition Centre
www.decordesignshow.com.au

### 18 JULY
**Shaping Wood: Shaves and Planes**
The Traditional Tools Group
Brush Farm House, 19 Lawson St, Eastwood, NSW
www.tttg.org.au

### 1 AUGUST
**Bat Flats Art Competition**
$10,000 prize pool, entry deadline
www.batflats.com.au

### 8 AUGUST
**Woodworking Joints workshop**
The Traditional Tools Group
Brush Farm House, 19 Lawson St,
Eastwood, NSW
www.tttg.org.au

### 7–9 AUGUST
WA Wood Show
& Out of the Woods exhibition
Claremont Showgrounds
www.wawoodshow.com.au

### 8–9 AUGUST
**Woodturners Society of Queensland Inc**
Woodturning Exhibition and Sales
Mt Coot-tha Botanic Gardens Auditorium,
Toowong, Qld
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Exhibition Park, Canberra, ACT
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### 25–27 SEPTEMBER
**Ballarat Woodies Wood & Craft Show**
Ballarat Woodworkers Guild Inc
George Davies 0409 331 627
www.ballaratwoodies.com.au

### 15–26 SEPTEMBER
**Creations in Wood**
Woodworkers Association NSW
Lane Cove Gallery
www.woodworkersnsw.org.au

### 27 SEPTEMBER
**Sharpening Planes and Chisels**
The Traditional Tools Group
Brush Farm House, 19 Lawson St, Eastwood NSW
www.ttg.org.au

### 10 OCTOBER
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# Shaped and Sawn

**Make this simple box form and you can then create your own designs.**
**Story by Neil Scobie.**

**Above:** Neil Scobie's basic kidney-shaped box can be sawn and shaped in a number of ways, depending on the tools you have at your disposal.

This is a basic project I taught in the 1980s when I was an industrial arts teacher in NSW. You can modify the shape, just be aware it's harder to sand in tight curves. Choose a timber that is stable, cuts and sands well, and looks good. Red cedar, Qld maple, silky oak, Tasmanian myrtle or Huon pine would all be good choices.

The box looks so much better if it's made from a solid block so the grain matches all the way through.

## Start by making a template

Trace the given shape using the diagram shown or design your own; in either case make a template so you can make more if required. I drew the inside curve onto a piece of 10mm ply then cut it out with hole saws and a jigsaw. Once the inside shape is smooth, draw a parallel line around the outside 7mm away. Once you cut this out and sand it you have a template to start the project with. Remember to allow for the width of the saw cuts in your block of timber.

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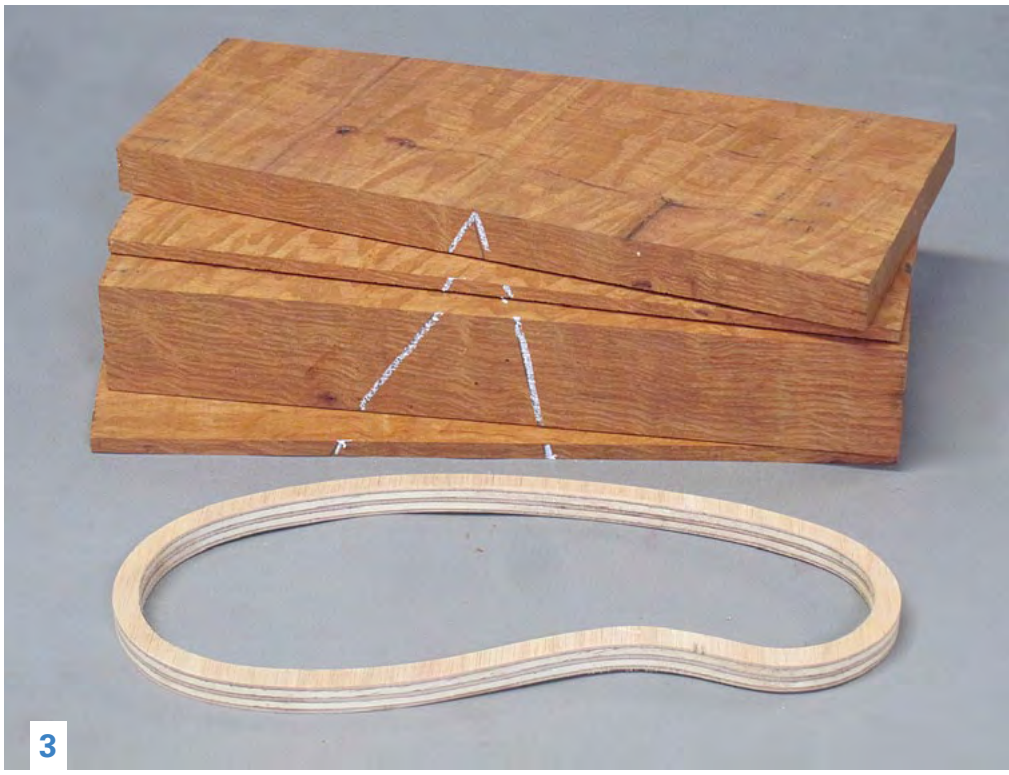
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## Step by Step

1 Square a block of wood so the wide face and the two adjacent edges are 90° to the face. Mark sections for the lid, body and base. A triangle was marked on the other side to show how the pieces go back together.

2 You will probably have to saw the lid and base sections off by cutting from the top and bottom. Set the sawblade to just over half the height of the widest part of the block and saw off the top from both sides. Go back to the jointer and re-flatten the top edge, then saw off the base. If you flatten one side before each cut then you will only need to thickness the second face.

3 Having thicknessed all four slices, assemble them as per the triangle. Before you cut the triangles off make sure you transfer the marking onto the new surface so you can keep the grain aligned. Now trace the template onto the top of the body slice and trace around it.

4 Using a hole saw of an appropriate size for each end, saw out the end curves, again working from both sides. Use a clean waste block under the cut to avoid chip-out.

5 Clamp the body in the vice and jigsaw out the centre waste between the two holes. Be careful not to overcut into the curves of the hole saw cut-outs.


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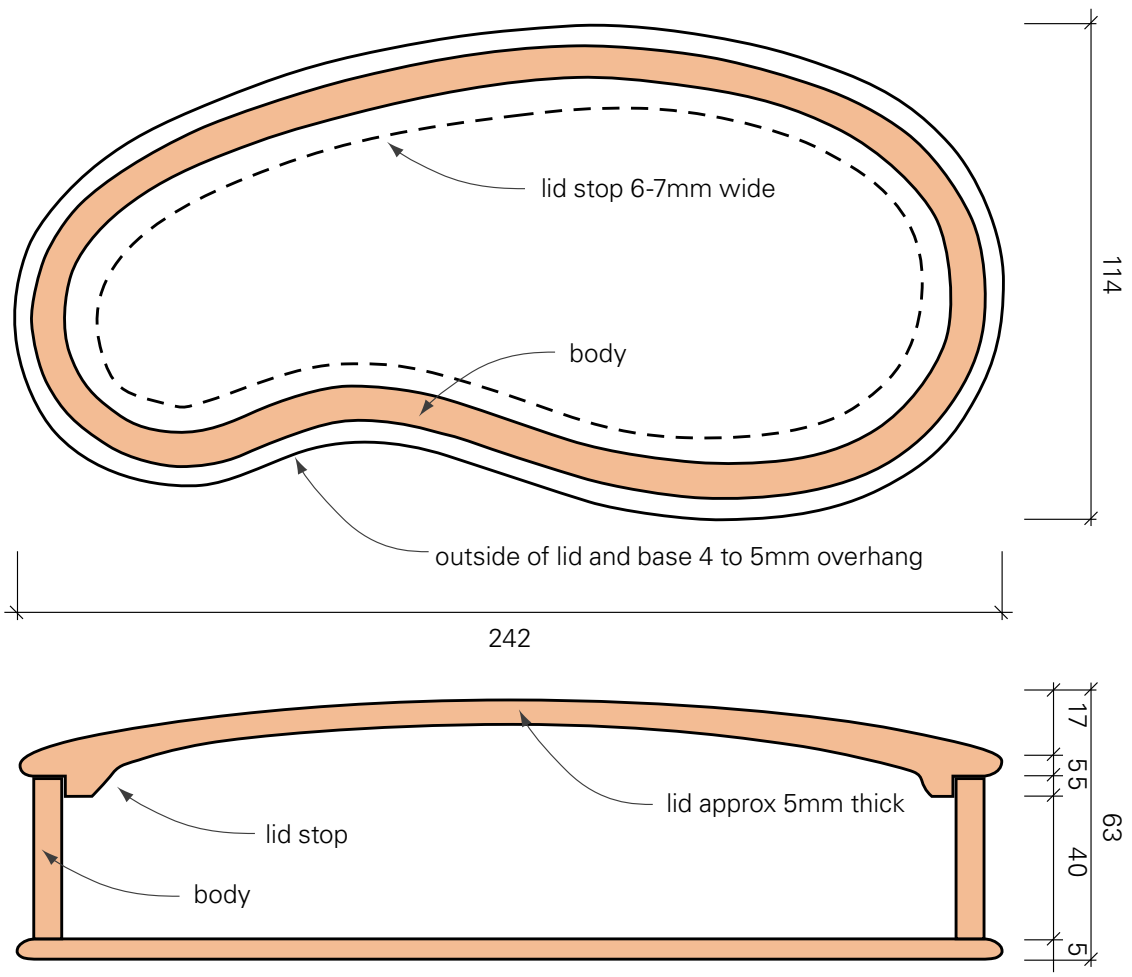
**Fig. 1 Plan and section**

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6 Depending on the gadgets you own for sanding, clean up the inside surface. You do need to keep the edge vertical. There are a few ways to do this job. The drum sander shown is held in the drill press. It came in a kit of about five drums with spare sanding sleeves. Drill out a hole in the waste block under the drum so you can sand right down to the bottom edge. An oscillating drum sander is another good way to get the job done. You can work down through the grits with different grit sanding sleeves.

7 A home made drum sander with hot water insertion rubber tube fitted over a piece of plastic pipe also makes a good drum sander. Make sure you keep the timber 90° to the drum or to the base. Another method is a pump-up drum sander like the one shown in **photo 19**. As with the home made drum, you need to keep it square to the base. After sanding with any of these methods, hand sand the inside to 320 grit.


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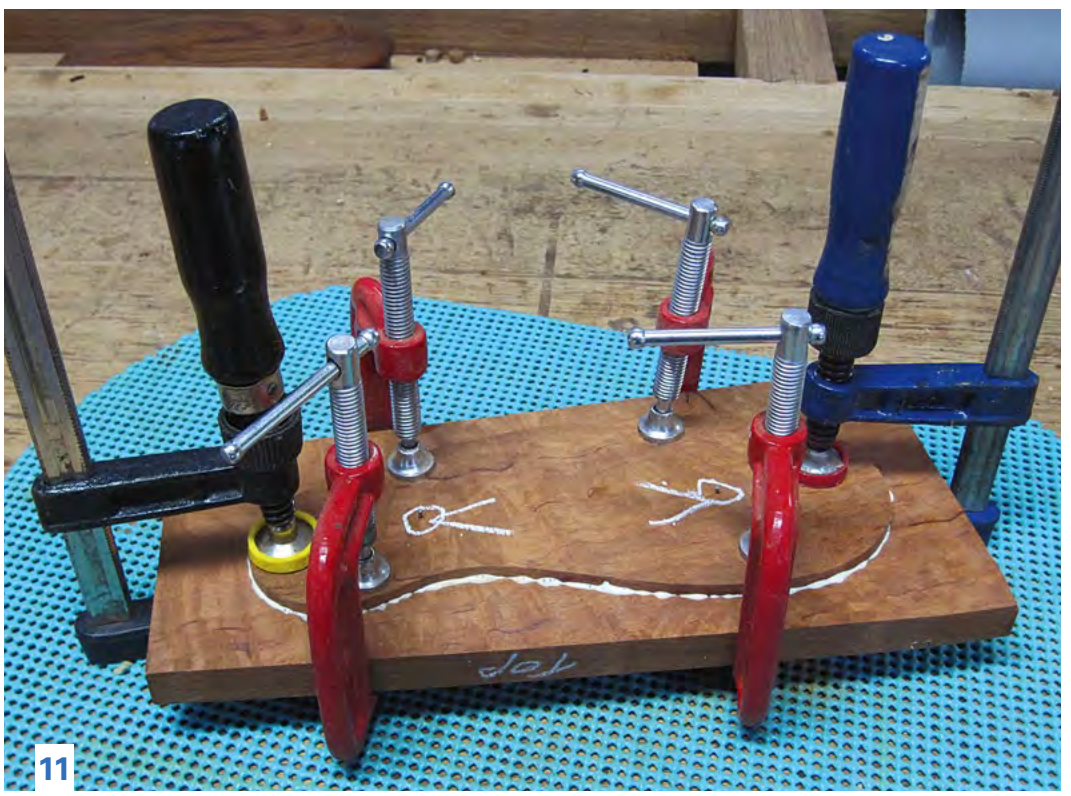
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8 Using your finger on the inside curve as a gauge, draw a parallel line about 7mm from the inside edge. If your inside shape is the same as the template you could just trace the template.

9 Trace the inside shape of the body onto the underside of the lid for the lid stop. Use a sharp pencil so you have a fine line to work to. Next job is to bandsaw the outside of the body and the lid stop.

10 Using a linisher or similar, sand the lid stop back to the line, checking it fits firmly into the inside top of the body. By holding both pieces together and up to the light you will be able to see where sanding is needed. Next sand the outside of the body on the flatter part of the linisher or on a disc sander. Sand the concave curve on the narrow end of the linisher or use one of the above mentioned drums.

11 You now need to glue the lid stop to the underside of the lid.

Use two small nails fitted halfway in to stop it sliding while you tighten the clamps. The white circles show where the nails are. These are pulled out after the glue is dried. Wipe the glue off with a damp cloth to save a lot of sanding afterwards.

**12** Trace the base shape from the outside edge of the body by holding a pencil vertically against the body. This should give you about a 4mm overlap. Bandsaw the shape and sand back to the line.

**13** Shape the top edge of the base using a 3mm radius round-over bit. You will have to hand sand the bottom edge as the bearing will run too far up the curve of the top.

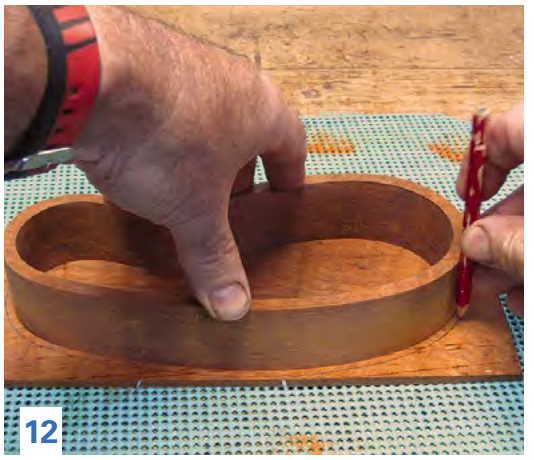
**14** Hand sand the upper surface of the base and apply glue to the bottom edge of the body. Clamp the base to the body and wipe off excess glue.

**15** Mark a line to work to near the outer edge of the lid stop about 3mm in. Clamp the lid to bench, remove the two nails and hollow the underside. I used a Mini Arbortech with Mini Turbo disc fitted to work back to 2–3mm away from the line, leaving the top about 6mm thick in the centre. If you do not have a powercarving tool you can use handcarving gouges to achieve the same result, just a bit slower.

**16** Use a power sanding pad in an electric drill to sand back to the line and get all the bumps out. An Arbortech Contour Random Sander would work here if you have one. I started with 120 grit and sanded up to 400 grit.

**17** For rounding over the top, place the lid on the body and clamp one end onto the bench and use powercarving tools to round over the edges. Swap it end for end to round the other end.

**18** Use a spokeshave to smooth and refine the shape.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19

**19** The pump-up sander is an ideal choice for sanding the top. If a little bit of air is removed it will hug the curve much better. Finally, hand sand the whole box up to 600 grit. I used a pad of 0000 steel wool as the last sand to shine the dense sheoak before applying four coats of Livos Kunos oil.

Once you have mastered this simple process you can experiment with different shapes and woods to achieve all kinds of box shapes and effects. Feature timber in particular will give the best results.

*Photos: Neil Scobie*

*Neil Scobie is a furniture designer/maker and wood artist who also teaches woodwork classes from his Lower Bucca, NSW workshop.*
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# Machining Difficult Timbers

**Some jointing tips and techniques to give your projects a good start. Story by Charles Mak.**


Charles Mak shows how knowledge of a few simple techniques can give better results when machining.

Rough-sawn wood gives us better value, more choices and better control over the stock dimensions and even the final appearance of the wood we can use – if you know how to machine it properly. Some rough-sawn boards are harder to flatten than others and the techniques needed to handle them are usually not found in the jointer's user manual. Let me show you how to deal with three common but challenging scenarios. First of all, I will share some workshop tips that will give you better control of the jointing process.

## Jointing tips

**Select the most suitable stock.** The first line of defence against difficult timbers is, of course, just to avoid them. That is, pick wood in the best condition – boards that are least twisted, least bowed and least cupped. If that is impracticable, use the least twisted for the longest parts of your build and the rest for smaller parts. This allows you to get the best surface and yield from the timber.

**Let the moisture content settle.** Where possible, try to mill stock that has been stored in the workshop for a few weeks so its moisture content is similar. And also, try not to dress


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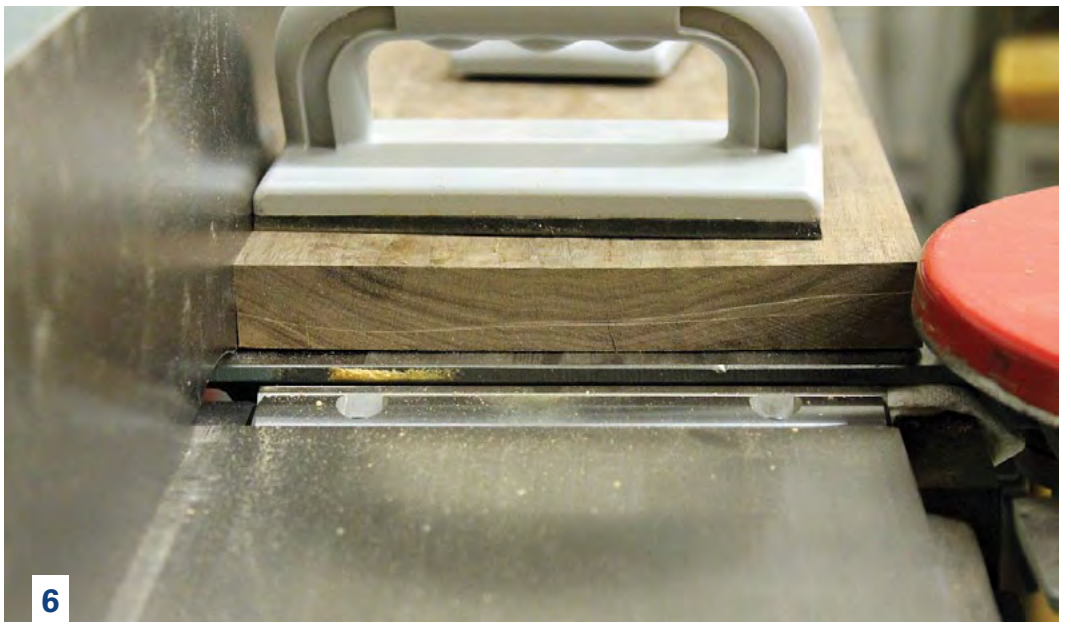
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your stock until you know you will be using it relatively soon.

**Cut stock to rough size.** Where possible, rough cut boards to approximate sizes as that will reduce cupping or bowing (**photo 1**). This will in turn result in thicker boards or longer pieces after the jointing process. The exception is that you should keep short pieces long enough to handle safely and with ease on the jointer.

**First place the bowed side down.** In general, to flatten a cupped or bowed board, place the concave face or bowed side on the jointer to prevent rocking (**photo 2**). You will, however, see an exception or two to this guideline later in the article.

**Compromise with difficult grain.** We all know that we should try to joint or plane with the grain. But, what if the grain reverses on the same side or edge? One should be more concerned about the severity of the tear-out than the amount. As a compromise I will feed the stock in the direction that will produce the least severe tear-out (**photos 3, 4**).

**Don't overdo it.** When pushing, use gentle downward force to avoid flexing a board as it will spring back.

1. Rough cutting boards to size makes handling them on the planer much easier.
2. Apply light pressure on the cupped stock and once the front has passed the cutter, shift one of the pads onto the outfeed side.
3. Feed the stock in the direction that causes the least severe tear-out, even if it is mostly against the grain.
4. Planing mostly with the grain may cause less tear-out but may also result in more serious chip-out.
5. When a bowed board is too long, start with one end of the board on the infeed table.
6. When planing a board with the cupped side facing upward, focus the pressure on the middle to keep the stock from rocking.

7. Shim the rear high spot by the same amount of space on the opposite diagonal corner so the board rests on three points.
8. Using just one push pad, applying pressure on the board near the end of the infeed table to make a pass. Repeat the shimming and pass as needed to remove the twist.


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**Finally...** Always remember to clear the infeed and outfeed tables of any shavings after each pass. Now, let's looking at flattening some difficult boards.

## Long and badly bowed boards

If you run a severely bowed board that is longer than your infeed table, you'll end up with a tapered piece as the rear end rises up onto the table. The trick is not to start with the front of the board on the infeed table, but rather place the board with its front end on the outfeed side and the other end on the infeed table, planing the trailing end first (**photo 5**). Then reverse the board and plane the other end in the same manner.

Repeat the process to increase the jointed surface on each pass until the board is relatively flat and then make a couple final passes with the grain in its full length.

## Cupped board slightly wider than the jointer

We usually plane a board cupped or concave side down on the bed, but when the cupped board is wider than the jointer's table, I handle it differently. I place the board convex side down and roughly centred on the jointer's bed (**photo 6**). I then place the push pads on the centre area of the stock to keep it steady and remove the middle spot on the convex side. As soon as the convex face does not rock, you can flatten the opposite surface on the thickness/surface planer and then the convex face with the same machine.

## Twisted boards

Twisted boards are more difficult to handle. Some woodworkers place a push pad on the centre of the board to balance the twisted face on two diagonal corners and then push the board towards the outfeed table. This balancing act is difficult to perform as one has to keep the opposite high corners off the table by an even amount.

Instead of balancing the board free hand, I shim the high corner or edge at the end of the board on the infeed table with some paper towel or wood shavings so the board rests on three points. Then hold a push pad down on the board near the centre end and make a pass (**photo 7**). If the twist is not removed, repeat the same shimming and passes (**photo 8**). Once the twist is gone, the board can be planed as usual using two push pads with steady pressure on the outfeed bed after the board passes the cutter.

Square and flat stock is fundamental to straight line, tight joinery and fine work. Knowing these jointing tricks and techniques should give you a head start for any project.

*Charles Mak, a semi-retired businessperson in Alberta, Canada, enjoys writing articles, authoring tricks of the trade, teaching workshops, and woodworking in his workshop.*
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