AUSTRALIAN
Wood
REVIEW
89

CURVING WOOD
Five Fun Ways

SHARPEN UP
5 Steps, 6 Rules

GLOW IN THE DARK LIGHT

PROJECTS
- KAURI TOOL CHEST
- LUMINOUS LED LIGHT
- RADIAL VENEER EDGINGS
- RECYCLED SILKY OAK TABLE

TESTED
- SUPERMAX 19-38 DRUM SANDER
- BOSCH BENCH DRILL PBD40
- EPILOG ZING 24 LASER ENGRAVER
- SPOON CARVING TOOLS
- THIRLWELL GAUGE
- OSMO OIL
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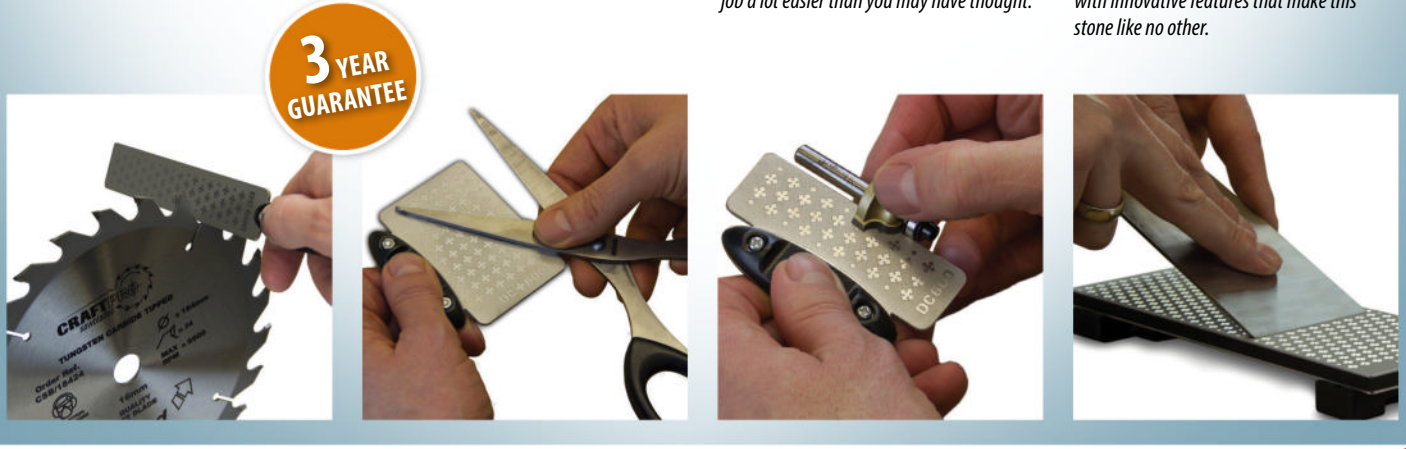

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TOOLS & EQUIPMENT

Editor's Letter

Lasers, glow lights, robotic CNC-tooled sculpture! This issue is absolutely going off as our writers reflect the collision of technology and woodcraft.

It might sound corny, but I truly believe we are living in exciting times. However digital tools are not taking away from cherished hand skills. With considered use, they expand the capabilities of wood artists and furniture makers so much more.

This theme carries over from last issue's spotlight on the current craft revival. Perhaps the digital world has refocused our gaze on those skills because at the same time some makers are rediscovering special purpose hand tools and appreciating their benefits.

This is illustrated with Troy McDonald's continued journey into the world of traditional hand planes. Machines are where it's at for the modern woodworker he says, but why not rediscover hand tool processes for their small scale efficiency and just the sheer pleasure of using them.

Adding curves to your furniture designs can elevate them. David Howlett, the man on the cover, summarises the main ways to curve wood, and also emphasises there's fun to be had in attempting to master them. Also on curves, Darren Oates's story looks at laminating jigs in depth as he shares the improvements he has made to the jigs he has developed.

Fun is everywhere this issue. Philip Ashley went a little crazy with the laser machine he was sent to review, while Raf Nathan had fun playing with, sorry, reviewing, the Bosch PBD40 bench drill.

But on a more serious note, all the fine tools in the world won't help if you can't sharpen them. Robert Howard has written about sharpening before, but this issue he pares back the process to five steps, with a few rules thrown in to boot. If you're not getting the results you want it might be worth trying!

Reviewing the history of the Triton brand made me think of the national anguish expressed when other brands like Arnotts, Vegemite, RM Williams and Billabong, to name a few, 'went overseas'. There's a sense of loss, and yet a retained 'ownership' of those brands, as the creativity and marketing drive that made them favourites is still felt.

How often do we hear the words 'you get what you pay for' and just think of our own experience of quality or unsatisfactory products received. Some companies just get bought out by bigger ones. Some sectors of industry are too inefficient or fail to stay relevant. But we only need to look at the example of supermarket brands to see that 'you get what you pay for' signifies buying habits that will ultimately determine the survival of makers and producers. If we can't fork out a bit more for quality products, all that will be left is the cheap stuff.

Speaking of going digital, some of our stories are now supported with a video component, as per stories by Robert Howard, Damion Fauser and Raf Nathan this issue. Subscribe to Wood Review TV on YouTube to find these and more. Some of you already know we also post news, events coverage and how-to stories on our website 52 weeks of the year. If you wish you can sign-up to our eNews at www.woodreview.com.au

Wishing you all the best for the New Year,

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David Howlett at Perth Wood School

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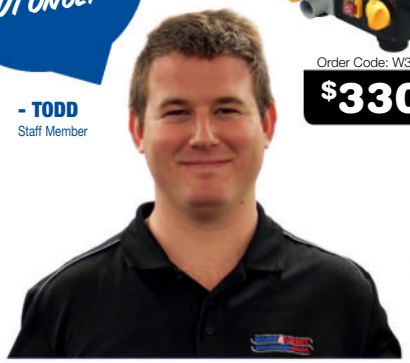

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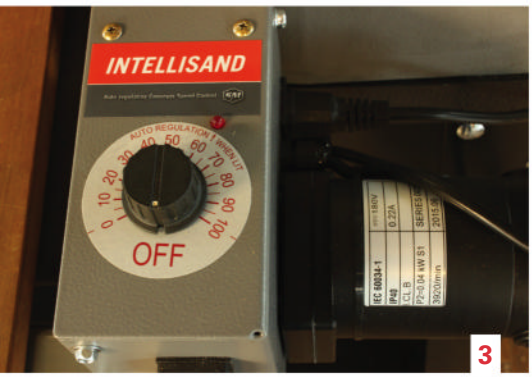
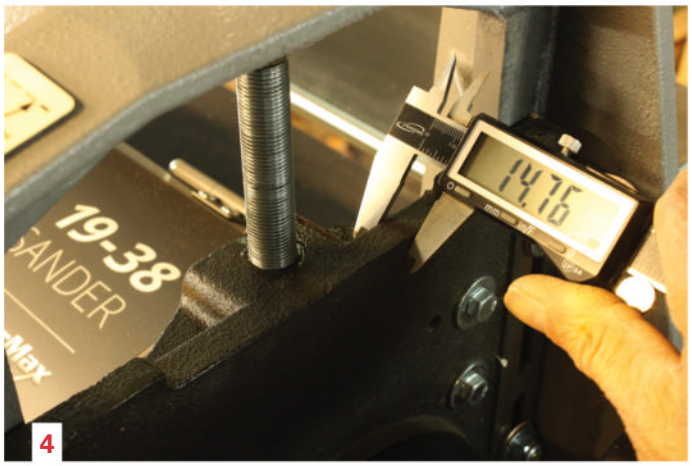
1. The SuperMax 19-38. The base is an optional extra that requires assembly.
2. Abrasive strip is wrapped around the aluminium drum and clipped into place.
3. Electronically controlled feed rate is powered by a small DC motor.
4. The machine has a strong, thick, cast iron and steel construction.





SuperMax 19-38 Drum Sander

Reviewed by Raf Nathan

SuperMax is a US company, although this machine is made in Taiwan. As a review machine the 19-38 came already assembled, however as a buyer expect to have minimal assembly of the main machine parts other than the optional in- and outfeed supports. The optional base and support wings will need around 45 minutes of bolting together.

This is a solid piece of gear with cast iron and steel main components. The heart of the sander is the large 5" diameter aluminium drum that comes with a 1.5hp motor driving it. Below the drum is the feed belt which is driven by a smaller DC motor. There are two spring-loaded tension rollers either side of the drum to keep panels from 'kicking'. A large handle winds the drum up or down giving in my calcs 1.6mm change per one rotation.

The comprehensive instructions state that it's set up in the factory but I wanted to check of course.

Best results are obtained of course with the drum aligned parallel to the feed belt. This is a painless process though, loosen four allen screws and adjust the spring-loaded 7/16" rise and fall bolt to raise or lower the drum to the platen. The workpiece should make contact across the width of the drum. However to truly get it aligned I sanded a wide panel a few times and adjusted the height until it was pretty well perfect to 0.2mm, not bad hey. Once set, it seemed to stay set.

The feed speed is adjustable via a knob, although the fastest setting is not exactly riveting. Maxxing out occurred at three metres per minute (1.8km per hour). The small motor for the feed belt and controller do have what is called Intellisand, which is electronic monitoring of the feed speed in relation to the amount of wood removal. In this way the feed rate automatically drops to avoid stalling or burning. As expected, after half an hour of review-style test sanding, the feed belt needed tightening. This is easy with the attached spanners adjusting the feed belt on either side.

The open-ended design is so that panels wider than the drum can be sanded. Theoretically with a drum width of 480mm you can sand up to 960mm in two passes.

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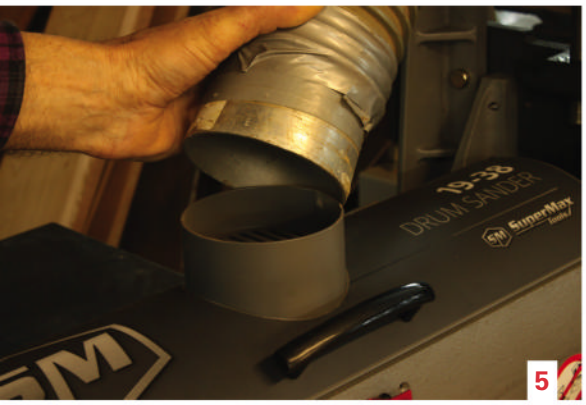

5. The 100mm dust port worked well.

6. Strong thrust-bearing mounted handle for height adjustment.

7. Digital gauge comes standard.

The abrasive belt used is cut from a roll and it's best to use an existing belt as a guide for this. The belt wraps around the drum and is held by finger-operated levers, one of which is spring-loaded to maintain tension.

A quality digital height gauge is included and this is easy to use. My experience was that it was easier to set the sanding height by running a piece of wood through and lowering the table to make contact thereafter – a third of a turn of the handle worked best. The digital gauge had some backlash so it was not as reliable for my style of use.

Initial test sanding was on some trays I was making, one of which was veneered with a solid frame. I was able to comfortably sand the frame flush evenly with the veneer without any problems. Burl and fiddleback came up beautifully.

Next up with great results was a 550mm wide slab of softwood using an 80 grit belt. Yes it was a slow process taking around 0.4mm thickness off at a time, but I could not have done it without the machine. The slab ended up nicely dimensioned and finishing off with a 120 grit gave an accurately thicknessed sanded panel. A 450mm wide figured guitar body that I had worked with a handplane was finished off quite quickly to a variation in 0.3mm across its width.

I reckon with more time tuning the alignment I could get a better result.

Best was taking some wood straight from the planer/thicknesser and sanding a couple of passes with 180 grit. This gave a production-ready surface suitable for most feature work. Sanding higher than this was quicker with a power tool though.

The SuperMax is naturally better handling soft woods, but hardwoods are no problem, just a little slower. For the price you get a rugged machine weighing 155kg that should well suit small workshops and sole operators. Guitar and boxmakers, furniture makers and veneer users should like it. Machine comes standard with digital gauge but the stand is $195, steel support wings are $185 and set of castors is $105. Abrasive belts can vary in price depending on quality and quantity.

Review machine supplied by Gregory Machinery, tel (07) 3375 5100, see www.gregmach.com.au

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Sandi Hands Sanding Gloves

Reviewed by Linda Nathan

This all-in-one glove and abrasive combo can work to make sanding jobs a lot easier on the hands. There are two styles, men's or ladies cotton and a heavier duty tradesperson version that comes in sizes 7–10. Both come left or right handed and can be purchased separately as such.

All have built-in grip pads on fingers and palms. The cotton gloves come in packs that include two hand-shaped pieces of sandpaper that attach by just pressing on. The sandpaper holds firm but comes off easily and can be reused again as you progressively move through different grits.

Replacement sandpaper hands come in packs of three in a good range of grits: 80, 120, 240, 320, 400, 1000 and 2000. In use the sandpaper lasted well.

I did wonder if there would be much advantage over normal methods but when used to sand the inner and outer curves of a small bowl it was easy rubbing with flattened fingers rather than pinching a folded strip or section.

Breaking the edges on a machined table leg by simply rubbing the whole hand over was fast and easy. No tension in the hand to achieve this. If you suffer from arthritis or simply want to be kinder to your hands and nails these sanding gloves are going to make sanding jobs a lot more enjoyable.

Cotton gloves are $19.95 each, tradepersons $14.95, and replacement abrasive packs of three are $12.95.

Order online from www.sandihands.com.au and also available from Mitre 10.

Osmo Polyx Oil

Reviewed by Richard Vaughan

I have used tung oil based finishes for over 30 years now. I like how they allow simple repair and rejuvenation when regular use leaves its mark, and I prefer the slowly wearing sheen of rubbed oil to a plasticky gloss that looks defaced with use.

A couple of years ago I noticed a change in the formulation of the product I'd been using so I tested Osmo Polyx Oil. I applied it according to label instructions to test boards of both silver ash and Tas blackwood and left them for two weeks to fully cure. Dollops of red and white wines, hot water, jam, chutney as well as wet tea bags were dropped on all and left for 24 hours.

The results mean I have been using and recommending Osmo Polyx Satin Matt as my standard finish ever since. Like all oil-based finishes Osmo adds a golden hue to the wood, but there are also versions with varying amounts of white ochre added which counteract the yellowing to retain the look of paler woods without looking like they have been limed.

Osmo recommends not sanding finer than 120 grit to enable penetration and this is okay for timber floors that the product is so widely used on but I want at least 240 grit for acceptable woodwork. So I experimented.

Sanding to 240 grit and finishing along the grain, removing dust with a tack cloth then dampening the surface with a mist of clean water from a spray bottle and leaving it overnight to dry seemed to open the wood to the finish. After the first coat a light sanding removed the raised grain and a couple more rubbed coats resulted in a finish that is as durable as stopping at the 120 grit.

It is essential that you only apply very thin coats of Osmo. It simply won't work if you apply it thickly. Think the slow build-up of French polish, and how shoe polish is effectively rubbed off to leave a miniscule layer.

Osmo is made from natural oils and waxes and has been in used in Europe for about 40 years where it has been certified in EU as safe for toys and food preparation bench surfaces.

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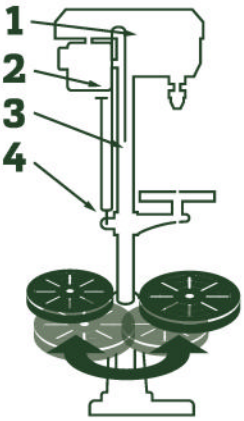

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$129.00

Edge Banding Set

TORQUATA

- Simply centre and run the groove cutter along the edge of your veneered MDF or ply board to cut the 60° profile and then centre and run the tongue cutter along your timber edging to match the veneer to create a snug, strong and virtually invisible joint. Suits material 12.7 – 25.4mm thick.

TS-250-SC
$2399.00

10" Panel Saw

SHERWOOD

- If you are mainly working with smaller section cabinet timbers and doing a lot of panel work – this saw is a great option as it has a built-in panel attachment with the ability to crosscut 8x4ft board with ease. It does not have a scoring blade like industrial machines. You can fix the sliding attachment in place to use it as a standard table saw to work with standard size furniture timbers.

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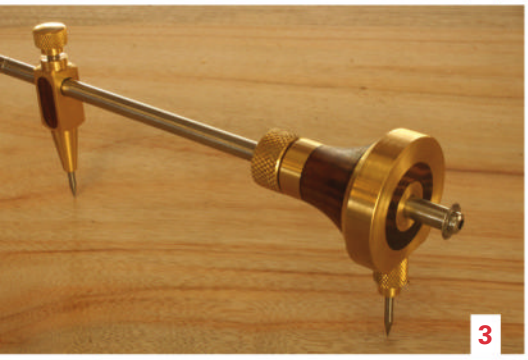
Thirlwell Gauge Set

Reviewed by Raf Nathan



1. Showing the full kit.
2. I liked the extra length on the awl.
3. Assembly as a trammel complete.
4. Used as a marking gauge

Made in Australia, this combination wood tool is quite exciting with its looks and multi-functionality.

It begins as a wheel marking gauge with a large cutter that can extend up to 165mm on the 8mm steel shaft.

The 50mm round head is a beautiful combination of brass and blackwood formed to a crisp flowing thumb-rest. I particularly liked the face detail with the circular wood and brass. The head locks to the shaft with a knurled ring grasping a router style collet. Over-engineered for a marking gauge? Yes, but that's what is so nice about this tool.

It worked as well as any other wheel marking gauge in various tests both along and with the grain. It is comfortable and well balanced to use. Although personally I am not convinced wheel gauges are better than pin and cutter types.

Unscrew the small brass fitting at the end of the shaft and reverse it in the same position. The tool is now an awl using a hardened tip. Despite its relatively long length compared to my other awls, after practice I found it was easy to get quite deft with it for layout and scoring. The long length changes the way an awl is used, and I liked it.

Next, the same brass fitting is unscrewed and now fitted to the head in a threaded hole. A separate brass fitting with a tip then slides onto the shaft and is locked with a knurled knob. It is now a trammel. An included shaft extends the trammel out to 440mm. The trammel can be used for precisely measuring between two points and for marking arcs and circles. The metal tip does tend to tear wood when marking an arc. A new update to the tool (not shown in the photo) is a pencil holder attaching to the trammel head which now completes what is a superb tool combination for woodwork.

The maker, John Thirwell, lives in Tecoma, Victoria and makes around 20 tools at a time. All are individually assembled and detailed.

Email John Thirwell at thirlwelltools@gmail.com

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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

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Constant Electronic

For optimal speed regulation, and maintaining speed under load

Depth Stop

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2 gears

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RB3682PB KRD 4/15

Tools for Spoon Carving

Reviewed by Carol Russell

Spoon carving has established itself as a very popular woodworking project for beginners and experienced woodworkers. It's got all the elements you need to enjoy the beauty of timber and stretch yourself creatively, with the added bonus of having a practical application as well.

Most carvers in Europe and America are using a curved hook knife for the bowls of the spoon and a straight knife for the back of the bowl and the handle. Spoons are generally carved hand-held using a protective glove on the hand that holds the workpiece.

Up until recently there have been no hook knives available in Australia, now there are three brands on the market – Mora from Sweden, M-Stein from the Czech Republic, and soon to be available, Pfeil, the well-known Swiss carving chisel brand. All brands have a range of whittling knives as well.

All brands have a range of different radiuses and also left and right-handed versions for pushing and pulling cuts. Mora also have some double-sided ones that mean you only need to buy one knife. I use these often but you do need to be careful not to push with the back of the knife but rotate it from the handle only.

The key thing you want in a hook knife is for it to be razor sharp and ready to go, they are a bit trickier to hone than standard knives and it's an inconvenience to have to work on them when you take them out of the packet.

The only hook knives that seemed totally work-ready to me were the M-Stein.

Carol Russell with a selection of tools for spoon carving, including long handled M-Stein spoon knives on the left in the foreground, as well as Mora, Pfeil and Flexcut knives.

Below: Mora straight and curved spoon knives.

I only had the right-handed ones to try but I found them very comfortable to use and we became friends very quickly. They cut cleanly on both green and dry timber and held an edge well.

The straight whittling knife seemed a little short in the blade and the handle was a bit cumbersome, but the blade was lovely and sharp and I liked it more once I got the feel of it. I'm used to using Flexcut whittling knives with a very compact handle.

I have been using the double-sided Mora knives for a while now. They did need a little bit of a hone at the beginning, but I'm very happy with them now. They have a very comfortable handle and will hold an edge very well once you've tuned them a little. The single-sided hook knife (#164) is tapered to a fine point and has a 13mm radius. Mora also make two sloyd knives with laminated blades, one 50mm and one 75mm. The Mora knives are beautiful and sharp, and the steel quality is excellent. I liked these knives a lot.

It's nice to see that we have some options to buy these knives locally now. Spoon carving is here to stay and hopefully we will see more cool tools available here soon. It's a very good start.

Mora knives from Timbecon, phone 1300 880 996 www.timbecon.com.au

M-Stein from Vesper Tools, phone (03) 5977 8901, www.vespertools.com.au

Pfeil and Flexcut tools from Carbatec 1800 658 111, www.carbatec.com.au

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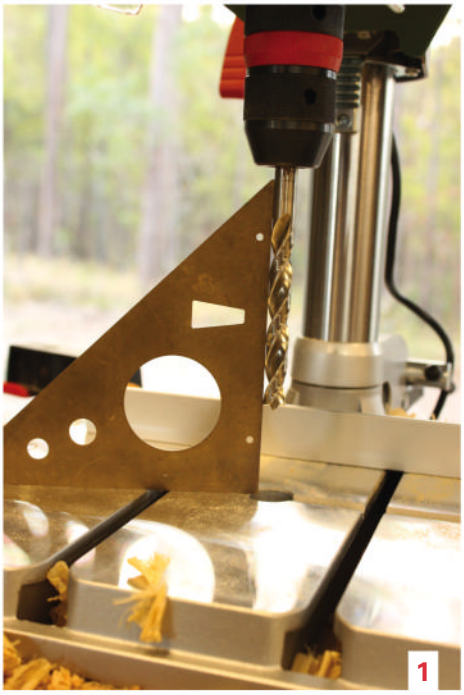
1. Alignment was very good and the table was very straight and flat.
2. There are pre-drilled holes in the base for securing the PBD40 to a bench.
3. The cleverly designed system to raise and lower the head is very good. The handle wheel could be larger.
4. Main control panel displays revs and speed with separate buttons for depth, laser and light.



Bosch PBD40 Bench Drill

Reviewed by Raf Nathan

The designers got it right with this drill press. It looks great, is well made and has enough power for its size. And dare I say, it has the appeal of an exciting new toy.This is a Bosch green range tool so it's not rated for trade use, however for part-time use it appeared more than adequate.

Assembly is simply dropping the head and steel shaft onto the precision milled aluminium table and screwing it in place. The motor is rated 710 watt (around 1hp) and for a brush motor it's not too bad on noise levels.

The head has a keyless chuck that locks securely. To position the head along the shaft is easy with a cleverly balanced lock assembly and depth stop. Drilling down is very easy with a slightly too small handwheel.

There is a front control panel with a cut-out off button that is also a dial for the digital display and motor. You can display RPMs or height. Set the drill bit at the surface of the wood to be drilled, select millimetres and push the zero/reset button. The display will now read 0mm (there is no inches option). The drilled holes in my test were able to be 0.02mm accurate to a ruler, so it's getting academic how accurate this is for woodwork.

There are two speed ranges with the lower used for more torque. Variable speed is 200–2500rpm set with a dial. It drilled a series of 40mm diameter holes in both speed ranges and I found the faster one fine with plenty of power.

There is electronic speed modulation that maintains the revs and really it never bogged down in any of the hole drilling I did. There is a twin LED light for the work area and a crosshair laser to sight the hole to be drilled. The laser was close to being aligned, around 0.5mm out on one line, but I could not see any adjustment to tune it in.

There is also a solid work clamp and small fence included.

Like I said it's not designed as a trade tool but as a DYI-er. And as that it's great. Certainly it is a fun tool to use although the laser alignment was out. It could probably handle light trade use for a while but it is certainly adequate for casual use in most workshops.

See the drill in operation in Raf Nathan's video report on Wood Review TV (search on YouTube).

Review tool supplied by www.bosch.com.au

Clockwise from below: A scene from this year's Melbourne Guitar Festival, held in October this year.

Donovan Knowles attended this year's Spoonies in the Tweed.

Richard Vaughan with some of the 21 crates of tools packed for PNG. See our online reports of this and the above events.

Wall clock by Steve Whitby, part of his recent solo exhibition at Logan Art Gallery, Qld in October this year.

Eagle and Possum, carved in Huon pine by Michael Reeves, tutor at the new Derwent Valley School of Creative Woodwork.

Tassie+Woodwork+ Accommodation

You don't need to be a maths head to see this adds up to 'perfect holiday'...

Newly established, The Derwent Valley School of Creative Woodwork is now offering ongoing and short courses in fine furniture making and woodcarving. Not only can you learn from wood artists and experienced teachers Chris Bush and Michael Reeve, but accommodation and a craft brewery are close by. Phone 0459 548 263, see dvscw.com.au

More Maleny

Next year's Maleny Wood Expo will run for three instead of two days. Queensland's Labour Day long weekend, April 30 – May 2, has given organisers Barung Landcare the opportunity to extend the expo from Saturday to Monday. The expo features a wide range of displays, products and demonstrations relating to trees and sawmilling as well as tools and techniques for woodworking. See www.barunglandcare.org.au

New to Newcastle

2016 marks the inception of the first Timber & Working With Wood Show to take place in the city of Newcastle. Local woodworking clubs and suppliers will feature along with many of the exhibitors who normally appear at capital city events of the same brand. See www.timbershows.com.au

Tools & Techniques Festival

February 13–14, 2016 will see some of Australia's top fine woodworkers and toolmakers share their knowledge and products at Sturt School for Wood's annual free-to-attend weekend. Sturt is located in Mittagong, NSW, around an hour and a half south-west of Sydney. See www.sturt.nsw.edu.au

40 Tables

That's the surface area that will be covered by all manner of hand tool riches come Sunday, Feb 28, 2016. The event is the Traditional Tools Group Sydney Tool Sale that happens only once a year...and running as it does from 9am–1pm there is only a small window of opportunity to grab yourself some bargains. Head to The Brick Pit Sports Stadium, Thornleigh, NSW. See www.tttg.org.au

Fortune soon, Hack back

Popular demand and prior attendee enjoyment have led Perth Wood School to once again bring woodworking legends Michael Fortune and Garrett Hack out to Australia to lead a series of workshops. Don't delay to enquire and book, see www.perthwoodschool.com.au

NZ Bespoke Online

New Zealand now has its own online brokerage for those who wish to have a piece of fine furniture custom made for them. The benefit is mutual for makers who may gain access to new clients. Bamtino Bespoke was founded by Adrien Taylor and Jonathan Wong and launched in October 2015. See bamtino.com for more information.

Our Man for Manus

Richard Vaughan, contributing editor to this mag is heading off in early January to a small island in Manus Province, Papua New Guinea to teach woodwork. Over a third of the island's 450-odd people signed up when the word got out! Read the full story about how it came about on our website, look under the 'News' tab.

For more news and events coverage subscribe to our free fortnightly eNewsletters, sign-up at www.woodreview.com.au

Strop It Now

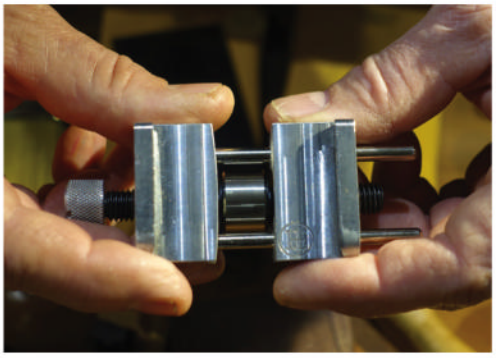
Flexcut's Dual-Sided Paddle Strop keeps all knives, plane blades, chisels, turning and mallet tools at peak performance. Use the rough leather 254 x 77mm surface with the included Flexcut Gold Polishing Compound to polish hardened steels. The smooth leather side gives a high-sheen, razor-sharp finish. Available from December, the strop costs $64.
www.carbatec.com.au

Product news

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

Sharpens Better

Henry Eckert's new Australian-made honing guide is an improved version of the 1930s Eclipse design. Precision CNC-machined for square and secure chisel holding, the new guide takes up to 50° angle blades. Unlike the old Eclipse, the HE guide has a stainless steel bearing so there's no danger of rust build-up in wet sharpening environments. This and more in Henry Eckert's free new catalogue. Phone (08) 8241 7777
www.henryeckert.com.au



Chains to Chisels

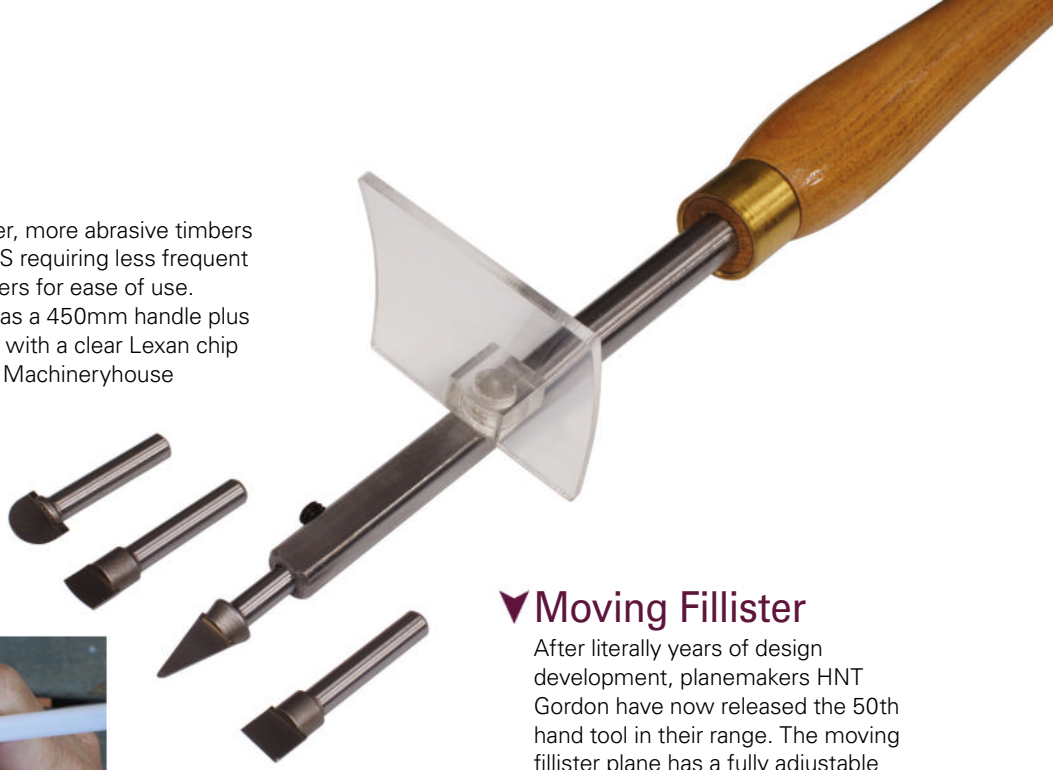
Laminated blue paper steel repurposed from 100 year old anchor chain wraps up the sides of Rentetsu chisels, strengthening and protecting their blades. The handle is Japanese red oak. Ideal for paring and flush trimming, the suppliers claim edge retention is very good. Each chisel is unique in appearance. Phone 0412 011 160
www.japanesetools.com.au

Performance Bits

These Promac PD ¼" and PE ½" micro-grain carbide bits promise cleaner cuts and longer life. The high shear angle gives cleaner and smoother cuts without burning. Computer balanced with anti-kickback features, and packaging that functions as storage make these high performance router bits worth checking out. Phone (07) 3390 2474
www.promac.com.au

Turns Tough

Carbide turning chisels are suited to harder, more abrasive timbers as their cutting edge lasts longer than HSS requiring less frequent sharpening. WT-3C chisels are also scrapers for ease of use. This carbide interchangeable tip version has a 450mm handle plus triangle, square, half round, 2" radius end) with a clear Lexan chip deflector all for $66. From Hare & Forbes Machineryhouse
www.machineryhouse.com.au

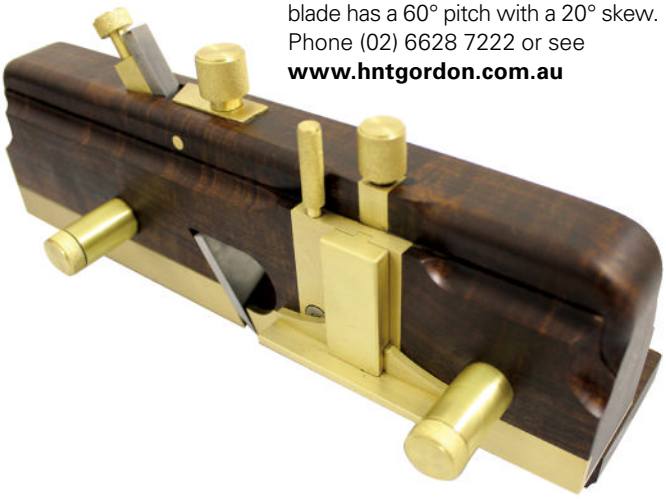


Light on Dark

Seeking a better way to see pencil marks on darker woods, Wood Review reader Steve Townsend tracked down these white leads that fit common mechanical pencil types. 'Chinagraph pencils are far too thick and crumbly for fine work. These hard, white leads with fine points can fit into the tiny holes in precision measuring and marking tools like those from Incra and Woodpeckers', he said. Pergamano 0.5mm white leads come in packs of 10 for around $11 from Australian craft suppliers
www.parchmentdownunder.com.au

Moving Fillister

After literally years of design development, planemakers HNT Gordon have now released the 50th hand tool in their range. The moving fillister plane has a fully adjustable blade, depth stop, nicker and fence. The depth stop and fence have a millimetre scale so no ruler is required to make a precise rebate. The plane can be ordered in premium woods – gidgee, bull oak and ebony. The 01 TS blade has a 60° pitch with a 20° skew. Phone (02) 6628 7222 or see
www.hntgordon.com.au

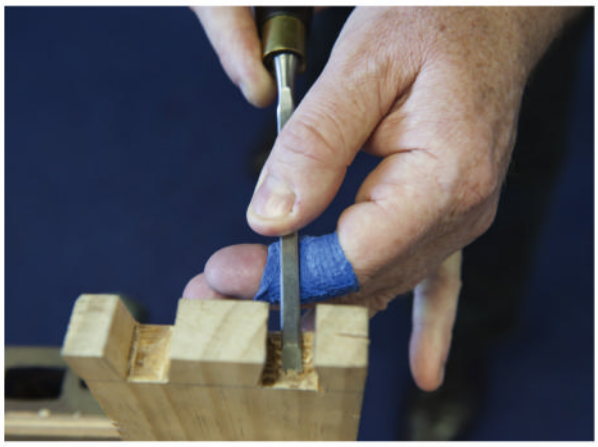


Switched On

Last issue when Allan Gilmore saw Charles Mak using an iVac Switch Box (p.96) it reminded him of his efforts to find a similar device locally. Finally his enquiries led him to testing out the Watts Clever Auto Powerboard shown. Several months down the track he reports great success used in conjunction with various woodworking machines. Available from Jacar Electronics
www.jaycar.com.au

Finger Saver

Flexxrap is ideal as a protective for hand tool workers and woodcarvers. It's flexible, acts like surgical tape and lets your skin breathe so the comfort factor is there. The tape comes in 4.2m rolls singly at $5.90 or in packs of six for $29. Choice of blue, green or pink.
www.carbatec.com.au



Left: Andy Groeneveld with his tool chest. The carcase is made from kauri pine and the trays from European oak. Photo: Mike Ford.

Right: With two levels of trays removed, the bottom of the chest with dividers for hand planes and saws can be seen. The trays rest and slide on sections of kauri screwed to the chest wall. The bottom support boards are 16mm, the top 8mm.

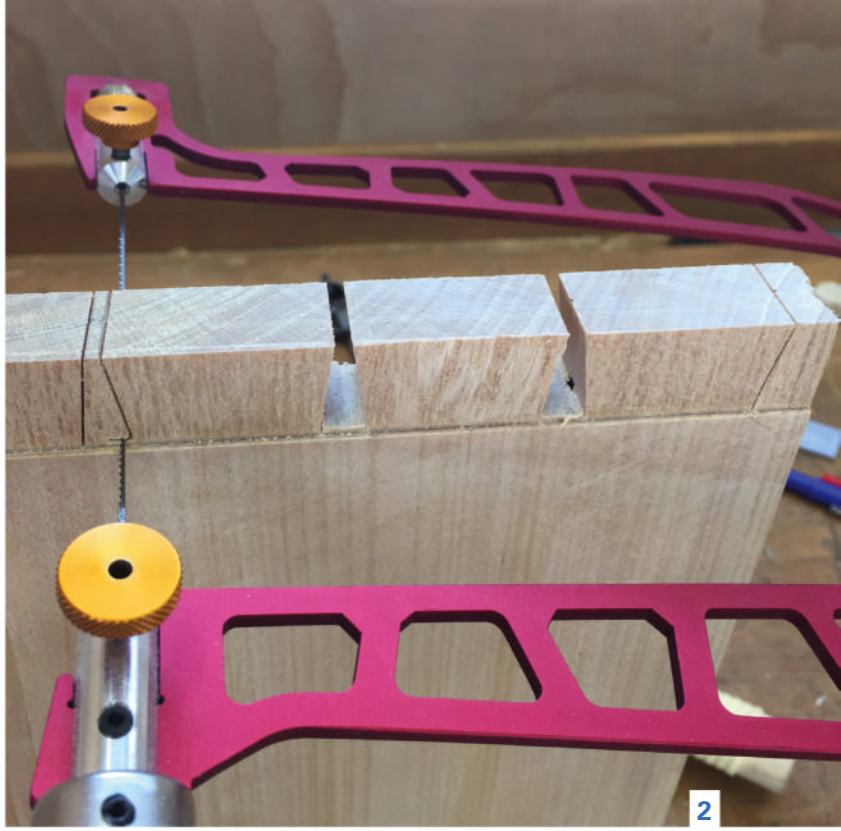
Kauri Tool Chest

Making a chest to transport his treasured tools turned out to be a skill building exercise. Story by Andy Groeneveld.

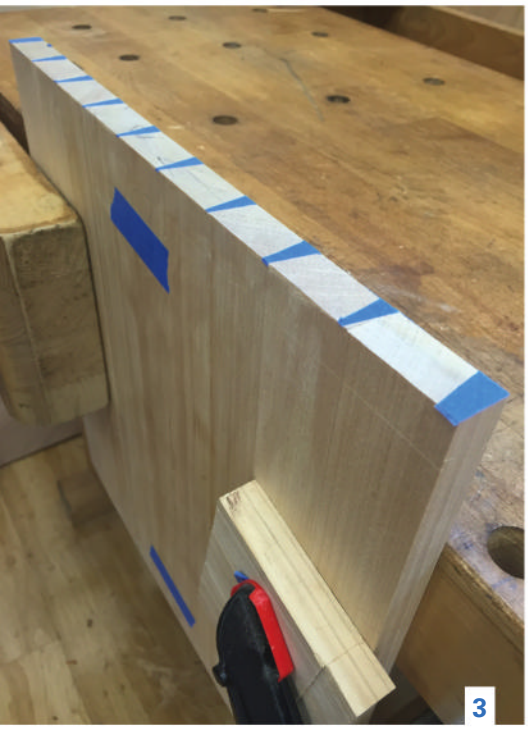
I have always had a soft spot for hand tool chests. Perhaps it's my passion for boxmaking that attracts me to them, but the idea of having all of my cherished hand tools neatly stored in a purpose built chest was very appealing.

A few years ago I had to travel to undertake a woodwork course. I had all my tools stored in a plastic tub, and although it did the job, it was a pain to work out of during the course. Since then I have continued to use the tub but recently I decided it was time to build a tool chest that could contain enough tools to complete a variety of woodworking tasks when I was away from my workshop.

The chest shown was made from kauri pine to keep the weight down, with European oak trays for a nice contrast. There are three levels of storage. The floor of the chest houses essential hand planes, handsaws and sharpening stones. Above that are four narrow trays that sit on two tiers of kauri and slide sideways for easy access.



1. Running a 2mm deep rebate on the inside face of the tail board to assist with accurate marking out of the pins.
2. Fretsawing the waste from the tails.
3. The blue tape left after the tail markings are transferred shows the waste to be cut for the pins.



The trays store a collection of chisels, marking out tools, squares and block planes that I have acquired over a number of years. I can swap these tools for others if needed for certain projects.

At home in my workshop I still prefer the use of tool cabinets. The convenient thing about this chest however is that the trays and planes can be lifted out and stored on my workbench or in a wall mounted tool cabinet for easy access. Then when I need to travel I can place the tools in my chest and away I go.

The chest is a basic box construction with hand cut dovetail joinery on the carcase and trays. The lid has a solid frame with leather covered panels of MDF. The floor has 6mm thick dividers for the planes. The four trays are lined with leather and have dividers. Of course you can customise your chest to suit your needs.

Making the carcase

Kauri has a pleasing but fairly neutral grain so it was easy to match up boards for the panels that were glued up for the sides.

I marked out all the boards, identifying the inside and outside faces. Inside surfaces were cleaned up with a smoothing plane as any hand planing done after the dovetails were cut would have affected the fit.

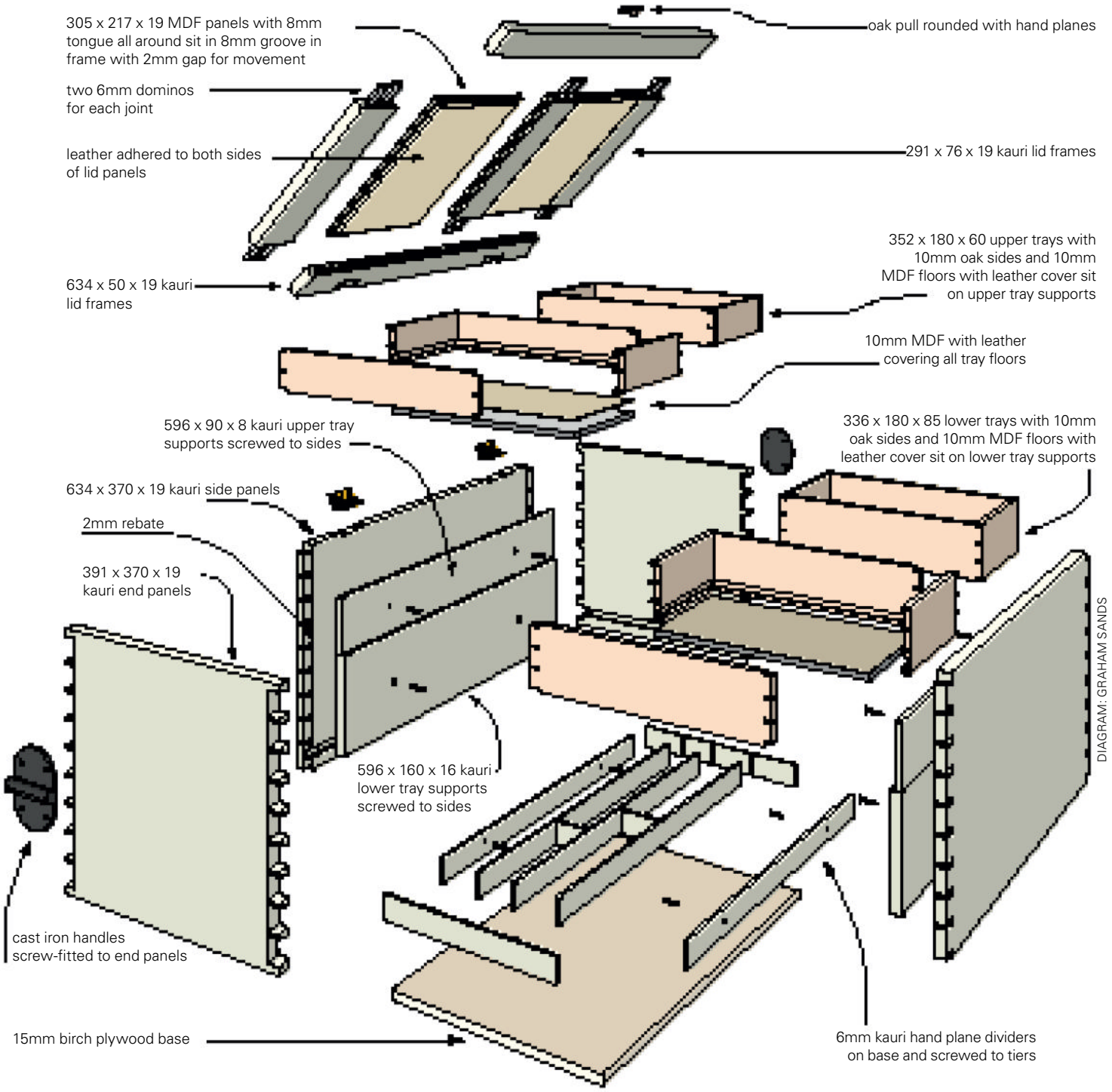
For the dovetails I used a cutting gauge to scribe a line around all the boards. I began with the tail boards (boards with dovetails cut) first using the thickness of the pin boards. The tail boards then received a 2mm deep rebate on the inside faces only (**photo 1**). This makes it easier to be accurate when transferring the tails to the pins as the rebate sits firmly against the pin boards, preventing it from moving. The new thickness of the tail boards is transferred to the pin board with a cutting gauge.

For cutting the dovetails I used a magnetic 1:8 dovetail guide that is made by UK craftsman David Barron. It's a handy little CNC-cut aluminium guide that produces consistent and accurate results. I layed out my dovetails using dividers and began sawing to the baseline using the guide and my dovetail saw. Once all dovetails were cut I used a fretsaw (**photo 2**) to remove the bulk of the waste.

I then used a freshly sharpened bevel edged chisel placed in the scribe line to lightly tap with a mallet to about halfway. Next, I turned the board over and placed my chisel into the scribe line to chop out the remaining waste. The half pins on the ends were sawed close to the scribe line and pared down with a chisel.

I applied blue painters tape on the endgrain of the pin board and transferred the tails to the pin board with a marking knife. After peeling away the tape to reveal the waste that needs to be removed on the pin board (**photo 3**), I used the guide again to cut the pins, and the fretsaw and chisel to remove waste.

Fig 1. **Components** (mm)



CUTTING LIST [l x w x d] in millimetres

Carcase					
Sides	kauri	2	634	362	19
		2	381	362	19
Base	birch plywood	1	620	378	15
Lid					
Frame	kauri	2	634	50	19
		3	291	76	19
Panels	MDF	2	305	217	19
Lower Trays (2)					
Sides	oak	4	336	85	10
		4	180	85	10
Base	MDF	2	325	170	10

Upper Trays (2)					
Sides	oak	4	351	60	10
		4	180	60	10
Base	MDF	2	344	170	10
Tray Supports	kauri				
Lower	2	596	160	16	
Upper	2	596	90	8	
Base dividers*	kauri	2	584	40	6
		3	588	40	6
		2	322	40	6
		1	77	40	6
		1	60	40	6

** Customise to suit*

4

5

6

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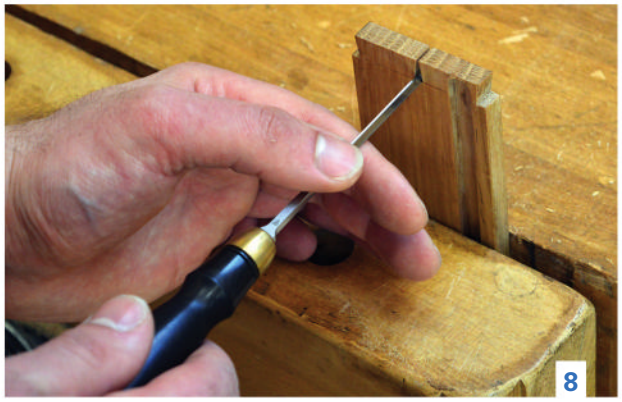

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4. Showing all four trays resting on top of the chest.
5. Jointing oak sections for the trays.
6. Final sizing of the tray components on the tablesaw.
7. Shooting the endgrain before dovetailing the tray sides.
8. A very small chisel was used to clear the waste on the tray dovetails.
9. A support was made from kauri to protect chisel edges.
10. Grooves for the chisel support were run on the router table.
11. Dividers in the base keep handplanes from moving around in transit.
12. Thicknessing the base dividers down to 6mm.

A dry fit of the carcase allowed me to pare any excess material away with a chisel. Once I was happy with the fit I set my router table up with a straight bit and created a 15mm wide groove set 20mm up from the bottom edge to accept the base. Seating the base up higher gives more strength to this load bearing area. I decided on a relatively thick base made from 15mm birch plywood as it would be responsible for supporting the entire contents of the chest.

The inside of the chest was pre-finished with thinned shellac as a sanding sealer and three coats of oil.

The chest carcase was then glued up and set aside to dry.

Making the trays

The oak for the tool trays (**photo 4**) had been jointed (**photo 5**), thicknessed slightly oversize, stacked and stickered in my workshop for two weeks to allow it to acclimatise. When I was ready to work on the tray pieces I dressed them down to final dimension and cut them to length using a mitre gauge on the tablesaw (**photo 6**). I overcut them by a few millimetres and used my shooting board to trim them to the correct length (**photo 7**).


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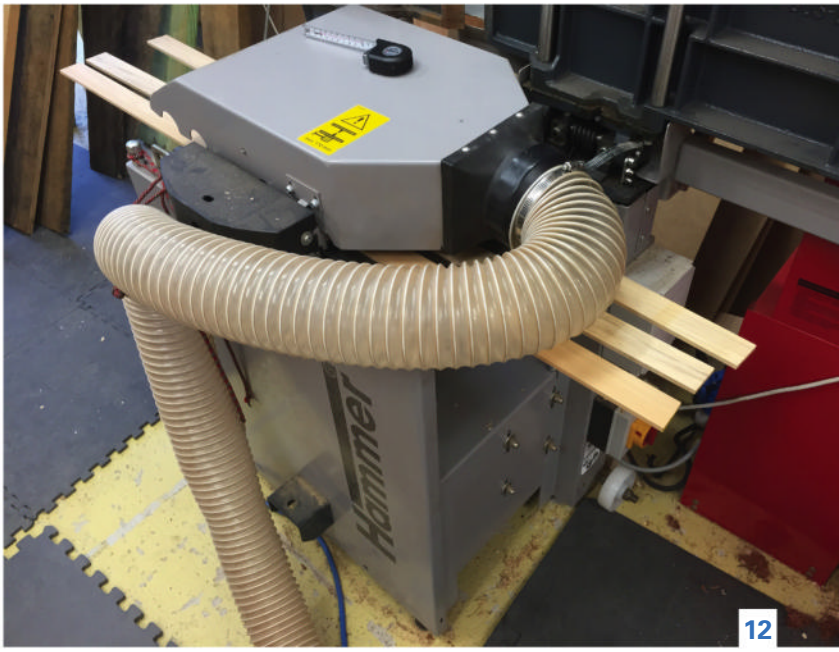


12

This ensured I had a nice square and clean endgrain in preparation for dovetailing.

The dovetails were cut as before however the spacing was much tighter than for the carcase so I used my tiny 1/8" chisel to pare away the waste (**photo 8**).

Once all the dovetails were cut I used my router table again to create the groove for the tray bases to sit in. These were made from 10mm MDF and lined with leather. It is said that leather has been known to rust tools if stored in direct contact unless it is vegetable tanned leather. While I am not certain as to whether the leather I have used has been treated, I have used this same leather for two years to store some of my tools without any problems.

I created dividers for the block plane tray to help prevent these tools from moving around when transporting the chest. My chisels sit in grooves (**photo 9**) created on the router table from a single piece of kauri pine (**photo 10**). Dividers are also fitted to the floor of the chest to separate my hand planes (**photo 11**). These were thicknessed down to 6mm (**photo 12**) and cut to length to fit in dados created on the router table. The handsaws sit in a block with saw kerfs that fit the width of the blade. As mentioned earlier, you can customise your chest to suit your tools.

Tray supports

The trays are supported by two pieces of kauri pine screwed to the inside of the chest. The bottom tier is 16mm thick and the top tier is 8mm thick. The offset between the lower and upper tier is what the bottom trays run on, while the top trays run along the upper support.

13. Detail of lid frame and leather covered panels.
14. The lid frame was grooved to receive tongues cut on the panels.
15. Brusso butt hinges were fitted to the carcase and lid.
16. Cast iron handles were screwed to the sides around 150mm from the top.
17. Four coats of oil and a final buff with wax completed the chest.

Double frame and panel lid

The lid is a simple double frame and panel design (**photo 13**). Two 6mm dominos for each joint make for a sturdy construction for this type of lid. Leather was glued onto both sides of the MDF panels for a look which I like. The panels have tongues on all sides that sit in grooves on the inside of the lid (**photo 14**).

I made the lid slightly oversized and used hand planes to flush it with the chest after installing the hinges to ensure a perfect fit (**photo 15**).

Finishing details

The chest was completed with a small oak lid pull rounded over with hand planes. For easier lifting I chose some sturdy cast iron handles with a matt black finish (**photo 16**). Holes were pre-drilled into the chest and the handles screwed on.

At this stage of the build only the inside surfaces were finished. So I used a combination of hand planes, scrapers and 400 grit sandpaper to prepare the surfaces for final finishing. All remaining surfaces received a thinned coat of shellac, which was sanded back with fine sandpaper.

Four coats of oil were applied, waiting 24 hours between coats. I lightly sanded the surfaces after the second and third coats with 1600 grit sandpaper. After the last coat I buffed the surfaces with a clean cotton rag. A final coat of wax for protection was applied about two weeks later (**photo 17**).

Building this tool chest was thoroughly enjoyable, and making it also improved my hand skills. The chest is great for when I travel and ensures my much-loved tools are stored securely. I recommend a project like this for anyone wanting to improve his or her basic woodworking skills.

Photos: Andy Groeneweld

Andy Groeneveld is a Sydney based woodworker who completes furniture commissions on a part time basis. Email AGwoodcreations@hotmail.com

Robert Howard at his permanently set up sharpening station. Honing guides are a must, he says.

Sharpen in Five Steps

Follow these rules and your tools will be razor sharp. A pared back method by Robert Howard.

I am going to try, in this article, to strip the process of sharpening down to its essence, to make it as simple as I possibly can. Once you have mastered it, I believe you will see that it is not a difficult process. As with a lot of things, the most difficult part is beginning, and especially beginning with real intent and a determination to succeed.

Give yourself the basic equipment you need. Please do not sabotage your progress right from the beginning by using inadequate equipment, in either quantity or quality. This is not the place for false economy. Remember that all the cutting tools you own are useless, and any dreams you have of doing good work with them are doomed, if your tools are not sharp.

On p.38 is what I consider a list of basic equipment for sharpening chisels and plane blades. The five-step process described here is for sharpening an inexpensive new blade, or a secondhand old blade. The more expensive blades usually allow us to skip the first step.

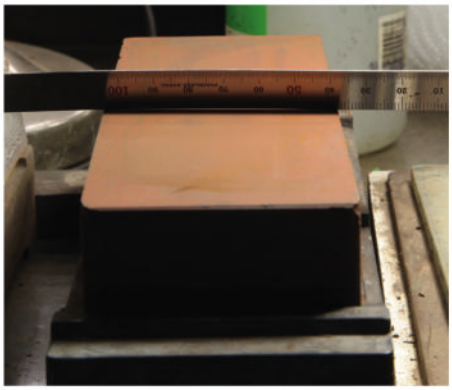
WHICH ANGLES?

To simplify and speed up the sharpening process:

GRIND all your tools at the same angle: 25°

HONE all your tools at the same angle: 35°

Neither angle needs to be exact, but you do need to be able to repeat them with precision. The best way to do this is to use an angle setting jig and a honing guide.



Step 1

FLATTEN THE BACK

Flattening the back of blades is where I use the coarse diamond stone, to hog the metal away as quickly as possible. Be aware that the manufacturers advise you to not bear down excessively on the stone. If you do bear down hard, you might rip the diamonds out of the matrix they are embedded in, and shorten the life of your stone.

Above: Flatten waterstones with firm and even pressure.

Above right: This ruler does have straight edges, but the rule itself is bent. This can too easily give false readings when used to check stones for flatness.

Right: Tilted one way, a bent rule can make a flat stone appear hollow. Tilted the other way, it can make a hollow stone appear flat. The reverse holds true for stones high in the middle.

Step 2

POLISH THE BACK

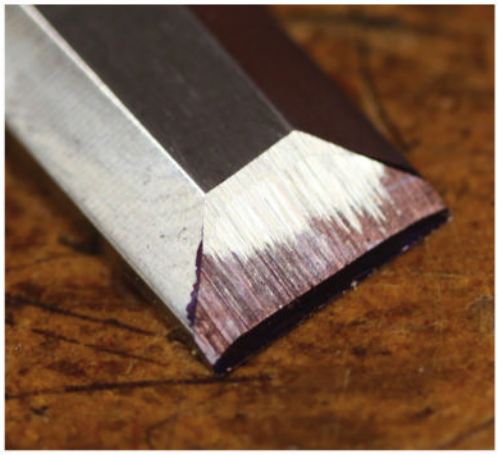
Once the back is flat, you need to work your way through the stones, from coarse to fine, in order to bring the back surface to a high polish. Take all necessary care and time to do this properly. If done right, it only needs to be done once, and you need only work this back surface on your finest stone from then on.

Left: What we are after: a polished back of the blade, finished on our finest stone.

Step 3

GRIND THE PRIMARY BEVEL

The tool rest on the grinder can be set using a new tool as these are usually ground to 25°. Hold the tool with the tips of your fingers (both hands), and only let it lightly contact the grinding wheel. If you have the correct wheel, dress it regularly, use very light pressure, and check your tool for temperature every quarter minute or so, you should not have any problems with overheating the steel. Grind until a half millimetre strip of the previous bevel remains, unless you need to remove a significant nick or broken corner of the edge.



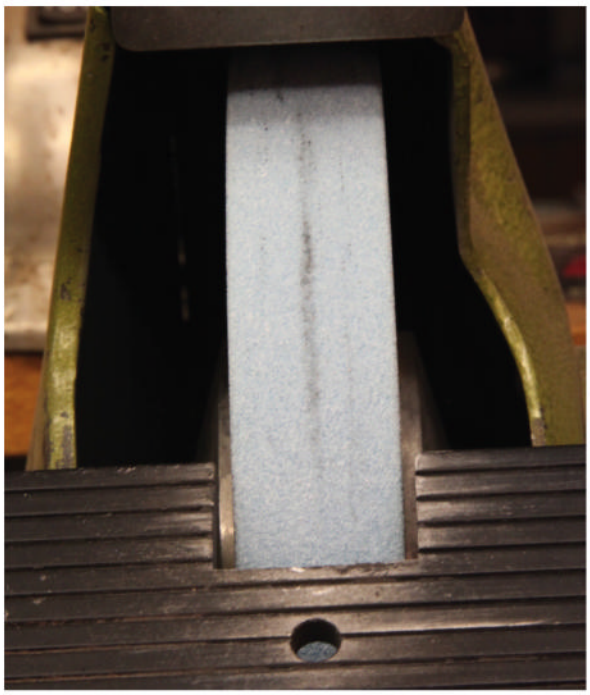
Top: Robert Howard at the bench grinder. Softer, aluminium oxide wheels which are usually white in colour give a cooler grind than the grey carborundem variety.

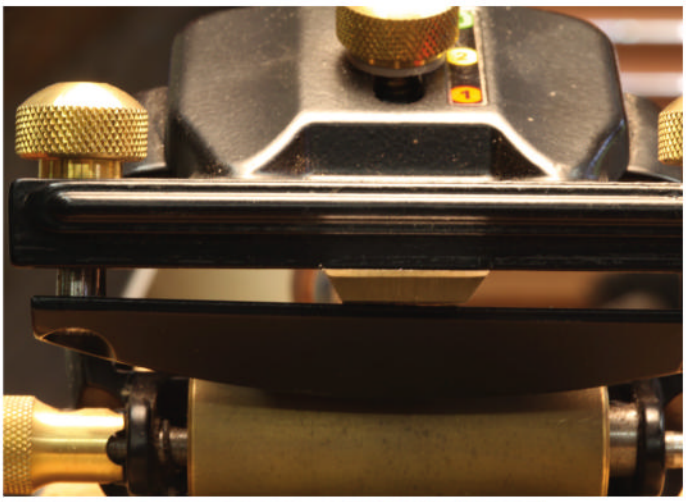
To Robert's left is his testing station, ie a particularly soft piece of cedar specially selected for this purpose. Interestingly, the softer the wood, says Robert, the sharper the edge required for a clean cut.

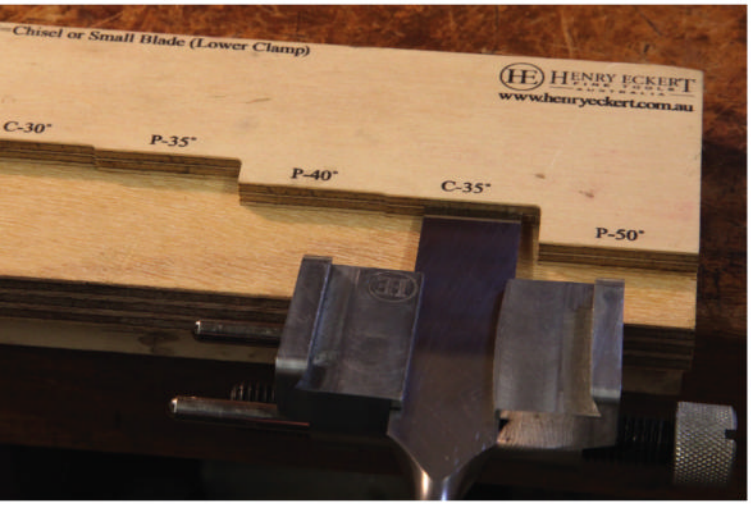
Above left: The author's preferred diamond tipped grinding wheel dressing stick. It is run lightly side-to-side over the grinder.

Far left: Using the Veritas grinder tool rest to grind the 25° primary bevel.

Left: A felt tip pen was used on the bevels to highlight marks left by the grinder. This helps when setting the tool rest, and in seeing the grinding progression.







SIX RULES

1. Use a honing guide. Always. For fast, consistent, repeatable, reliable results, it is essential.
2. Always ensure all your stones are flat. Check them after every use. Believe me on this, because I have learned the hard way.
3. Your straightedge must be both flat and straight. Straight alone is not enough.
4. Dress your grinding wheel after every few minutes of use.
5. Always stay focussed on what you are doing, especially if the process is long and boring.
6. The most important rule of all is to take these rules seriously.

Step 4

HONE THE SECONDARY BEVEL

Place the blade in the honing guide at the 35° setting, and work your way through your stones from coarse to fine. The first stone has to do whatever remedial work the edge still requires. Work on the first stone (I use the coarse diamond stone first) until you are quite sure the edge is free of whatever the damage was that brought you to the sharpening stones in the first place, and which has not been removed by the grinder.

You might need to simply remove a wear bevel caused by normal use, or one or more nicks caused by careless handling or a tough piece of hard wood. Or you might be reshaping and repairing an old tool, to give it a second life. The first stone has to do all this. Each subsequent stone only has to remove the grind marks of the previous stone, and replace them with its own, finer marks. It is the exact same progression as happens in sanding.

If you find it difficult to judge how long to stay on each stone, pick a safe number, say 30, and do that number of back and forward strokes on each stone. Clean the blade, and the honing guide roller, before moving to the next stone so as to avoid contamination.

Clockwise from top left:
Black marks on the wheel indicating a build up of metal there. Time to dress the wheel surface.

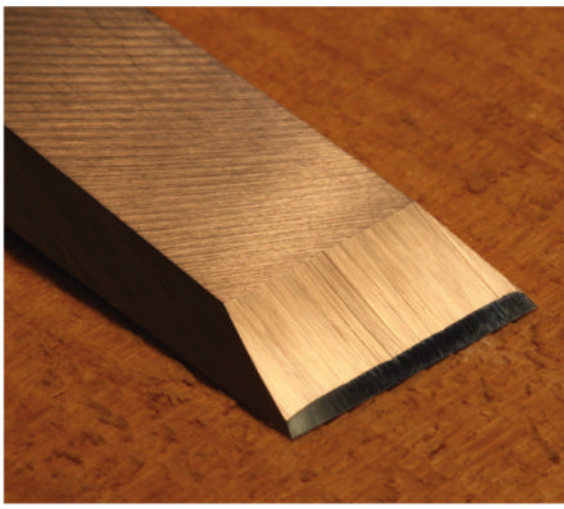
The lower clamping bar in this photo has been locked up unevenly, creating a gap on one side of the chisel. This must be corrected as it makes the blade too easy to move out of square in the guide.

Henry Eckert angle setting jig for use with the Henry Eckert Honing Guide.

Veritas Mk II honing guide with angle setting attachment in place. Colour coding works to eliminate complexity.

Below: On the right, plate glass topped with fine sandpaper is used for flattening stones as is the diamond flattening stone next to it. Next to these are a range of waterstones of varying grits.

Right: This is what we are aiming for. A polished back, with an evenly and finely ground edge.



Step 5

REMOVE ANY BURR OFF THE BACK

With a 6000 grit finish on both front and back surfaces, there will be little evidence of a wire edge. However, I always touch the back surface to my finest stone to finish, as every second of contact with the finest stone does help build the degree of polish on the surface. As the sharpness of the blade is a direct consequence of that polish, the better it is, the sharper the tool will be.

Learn by doing

As you work through those five steps, a number of things can go wrong. If that happens, you need to identify the problem, and correct it. Take your time with this. Sit down, have a cup of coffee, or tea, and think a bit. Sharpening is a mechanical (i.e. logical) process.

A trick you might try is this: imagine you have to take a new blade, and deliberately create the problem that you have. How would you do it? If you are not sure, take another blade and actually try to do it. Test your theory, or theories. Chances are that you will find the answer, and you will certainly learn something new about the sharpening process.

I have written previously about the common problems you might encounter (see *Sharpening – a Troubleshooting Guide in AWR #51*), and you can now find that article on the AWR website in the 'How-to' section. We also showed some of the techniques mentioned above in a short video which is up on YouTube (search for *Wood Review TV*) now.

Remember also that the best and most common way of learning, is by making mistakes. It is only by having things go wrong, and working out why, that you will eventually master the sharpening process. Once you do master it, you will be surprised to find how straightforward, and simple, it suddenly becomes.

Photos: Robert Howard, Linda Nathan

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

BASIC EQUIPMENT

1. **BENCH GRINDER** a hardware store 150mm grinder will do.
2. **WHITE ALUMINIUM OXIDE GRINDING WHEEL** Norton 38A 60 JVS or equivalent, 25 mm wide.
3. **GRINDING WHEEL DRESSER** I like the industrial diamond dressers. An inexpensive one will do.
   (Optional: you can add a Veritas Grinder Tool Rest, or the less expensive Carbatec model, in place of the crude one that comes with the grinder.)
4. **DIAMOND STONE** DMT 200 x 75mm coarse
5. **JAPANESE WATERSTONES** 1000 or 1200 grit and 6000 grit
6. **HONING GUIDE** Veritas, Lie-Nielsen or Henry Eckert are the best. A cheaper Eclipse style jig will do the job if the others are too expensive.
7. **ANGLE SETTING JIG** see your honing guide instructions.
8. **PLATE GLASS STRIP** about 400mm x 250mm, and 10 to 12mm thick.
9. **WET AND DRY SANDPAPER** 180 or 220 grit.
10. **10X MAGNIFYING GLASS** Note: this is important, so don't skip getting one of these. It is hard to fix something that you can't see, or don't see.

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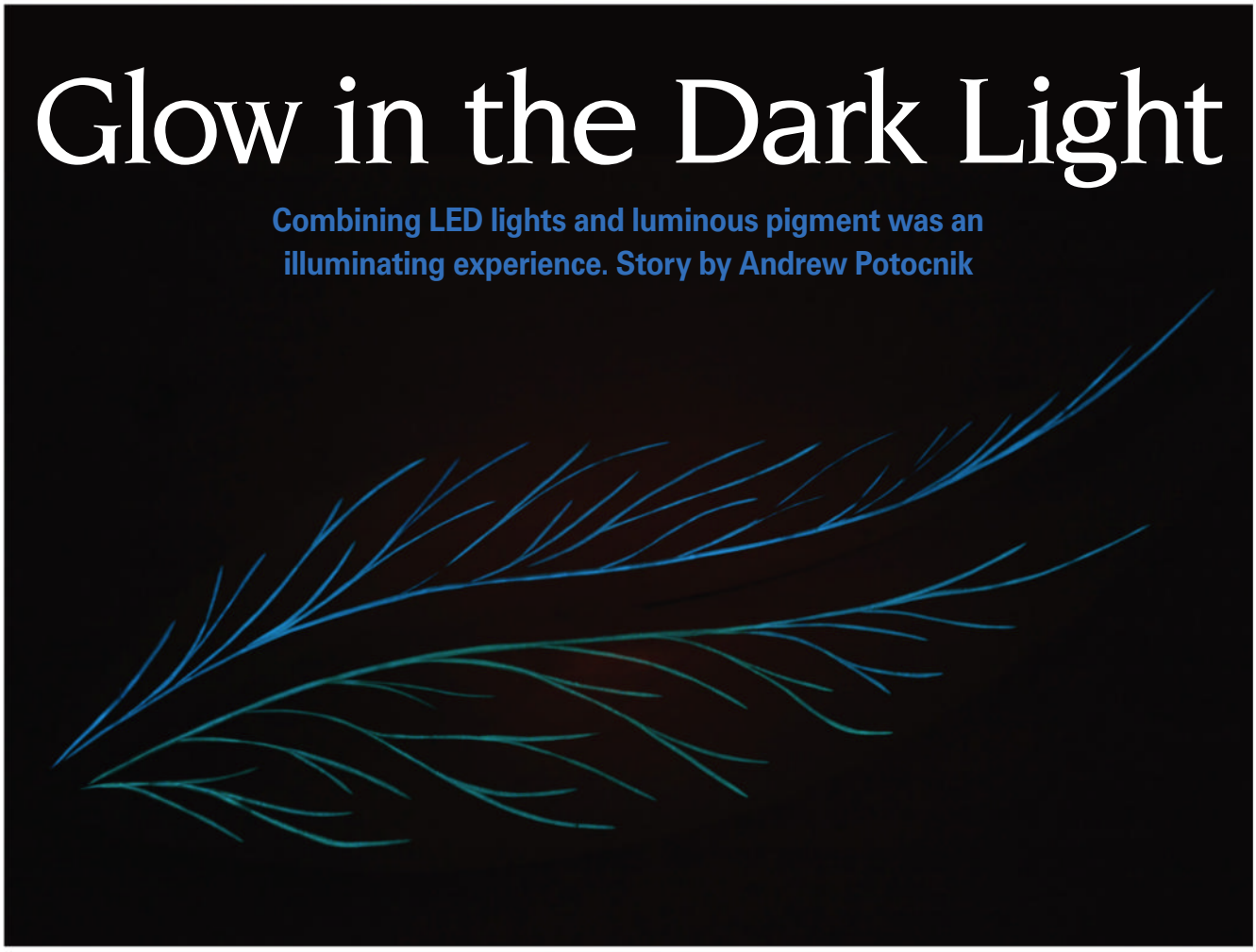
Glow in the Dark Light

Combining LED lights and luminous pigment was an illuminating experience. Story by Andrew Potocnik



There's been an idea brewing in the back of my mind for ages about using LED light strips. They come in one metre lengths that can be cut or extended via minimal soldering, and best of all, they come in a kit complete with wiring and a transformer, ready to plug into a power-point. No need for an electrician as the diodes are part of a pre-glued aluminium strip that can be moulded to any shape that's just waiting to add light to your life.

I needed something to spur this idea on…and this came when AWR's editor suggested incorporating a 'glow in the dark' resin additive into a project. I did some internet research into what these products are, how they can be applied to wood and what others have already used it for.

Although I really liked what I saw, I wasn't keen on filling voids in tabletops with something that glowed once the lights went off…there had to be a more interesting application for this wondrous product. These thoughts sat for a few days in my 'cranial computer' before one of those eureka moments where all the stars aligned and the world made sense!

The concept was to create a mood light carved to resemble a leaf-shaped profile. This would be wall-mounted, but stand proud so the LEDs could be attached behind to illuminate its

outer form and also create a shadow. The piece could then be further 'highlighted' if carved lines on its surface were filled with resin mixed with the glow in the dark additive. And so I was off on a journey of investigation, and potential failure too.

Getting started

For this project I opted to use a board of desert ash which I'd salvaged and slabbed several years ago when our municipal council was clearing noxious weeds from a local creek. Ash invades and chokes our waterways but I love its fragrance, grain and working qualities, so this light could also show how weeds can be used productively whilst being removed from our environment.

To get this project underway I sketched a design on a board that I'd already taken a piece out of for another project and adjusted what was in my mind to suit the remainder (**photo 1**). I cut this out on my bandsaw and moved to a belt sander to refine the outer form (**photo 2**). No matter what your mind conceives as a balanced form, there is always a need for refinement once a two dimensional drawing is converted into a three dimensional object.

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Shaping the form

I used an Arbortech Turboplane and Contour Random Sander to develop the face of the form. This allowed the shape to emerge faster than I'd anticipated (**photo 3**). I also needed to under-cut the back of the form, much as a bas relief sculpture allows the interplay of light and shadow to feature its overall shape and details, and I was conscious of the fact this piece would rely on back lighting to act as a mood light (**photo 4**).

Refining details required hand work and elbow grease, but at least the workshop was quiet for a while. Scrapers enabled me to creep up on concave edges (**photo 5**), while a range of files, rifflers and carving tools allowed me to refine tight spots both on the front and back (**photo 6**). After that, hand sanding was used to pick up details and to eliminate undulations in the overall surface left by power tools. Seeing this piece would rely heavily on shadows when the light isn't on, it was imperative to ensure all lines were crisp and flowed smoothly.

Adding the glow

Now it was time to mix the glow in the dark additive with clear two-part resin and apply it to lines carved into the face of the leaf form. I intended these to be an interplay of the skeletal structure of a leaf (the veins) and waterways that join and eventually combine to flow as rivers. But first I carved some lines on a sample board and did a trial run to see if all would combine, bond and glow.

The technical information for Luxilum glow pigment* advised a ratio of 3:1 between body and hardener (based on weight not volume) which I followed dutifully with digital scales in tow, while the additive information said a 15% mix would work best. I then poured the mixture into my test carving and hoped for the best… Winding up work for the night I turned lights off and you cannot imagine my delight when I noticed the test piece was already glowing, it worked!

To begin the real thing I drew a series of radiating curved lines running into a main 'spine' on each


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half of the form, reworking the lines until arriving at something I felt was balanced to the eye (**photo 7**), then attached a holding block to the back so it could be held in a vice ready to begin carving (**photo 8**). Once all lines were carved I sanded away left over pencil marks and with the aid of a strong side light began to refine any that were in need of extra attention (**photo 9**).

Preparing to mix and apply the resin and glow additive I gathered everything together, including mixing ratios, scales and little stirring sticks (**photo 10**). Note the plastic wrap on the scales in case of spillages – an idea from the kitchen, not the workshop! Once mixed slowly and evenly to avoid the formation of bubbles, resin was applied to the carved lines carefully with the mixing stick ensuring all lines were filled with ample excess to compensate for potential shrinkage or spreading of resin as it cured (**photo 11**).


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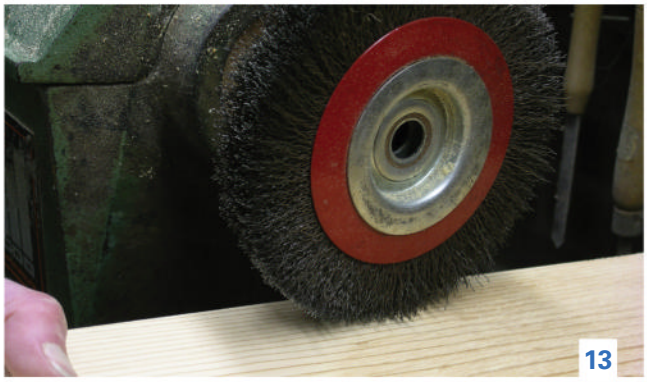
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The resin was left for two days to set and harden and then the excess material was scraped and sanded away, eventually working through various grits to finish sand the entire face of the leaf. Winding up at 320 grit, I also eased the edges and ensured everything felt smooth to the fingertips.

Adding the lights

Initially I planned to carve away material from the back of the 'leaf' so LEDs could be attached, but it soon became apparent that it would be better to leave the back flat, add a plywood spacer and attach the LED strip to its edge so light could shine out from behind the leaf form.

To create a template for this spacer I laid a piece of paper on the back of the leaf and pressed around the edges of the form with my fingers to create an impression of the form so I could draw a scaled down version about 20mm inside the undercut profile. This was cut out, taped to some 10mm thick plywood and once again cut out on the bandsaw before refining on belt and spindle sanders (**photo 12**).

Adding a backing board

All was good so far; however as is often the case, my ideas evolve as the project develops and it then made more sense to add a backing board. A 45mm thick oregon board was sawn in half to book-match and then wire-brushed (**photo 13**) to wear away softer parts of grain and leave hard growth rings prominent which would pick up a shadow line from the LED light. I might have achieved a more subtle effect with a sand-blaster; however I could not access a sand-blast cabinet large enough to accommodate the 800mm long panel.

Not completely satisfied with the amount of light emerging I then added another strip of LEDs and another spacer that was 10mm smaller around its perimeter so it was less likely to be seen from an angle.

The light strip was taped on to test its effect (**photo 14**), before gluing everything in place (**photo 15**), drilling holes for wires to slip through and finally assembling all components in preparation for the grand test.

Does the light work visually, as a piece of wall sculpture, as a mood light, and does the 'glow in the dark' bring a smile once all lights are switched off? For me it does, but I've leave it up to you to decide.

Photos: Andrew Potocnik

** Luxilum glow pigment is available from Nite-Glo Innovations, see www.nite-glo.com*

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

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Evolution of a Jig

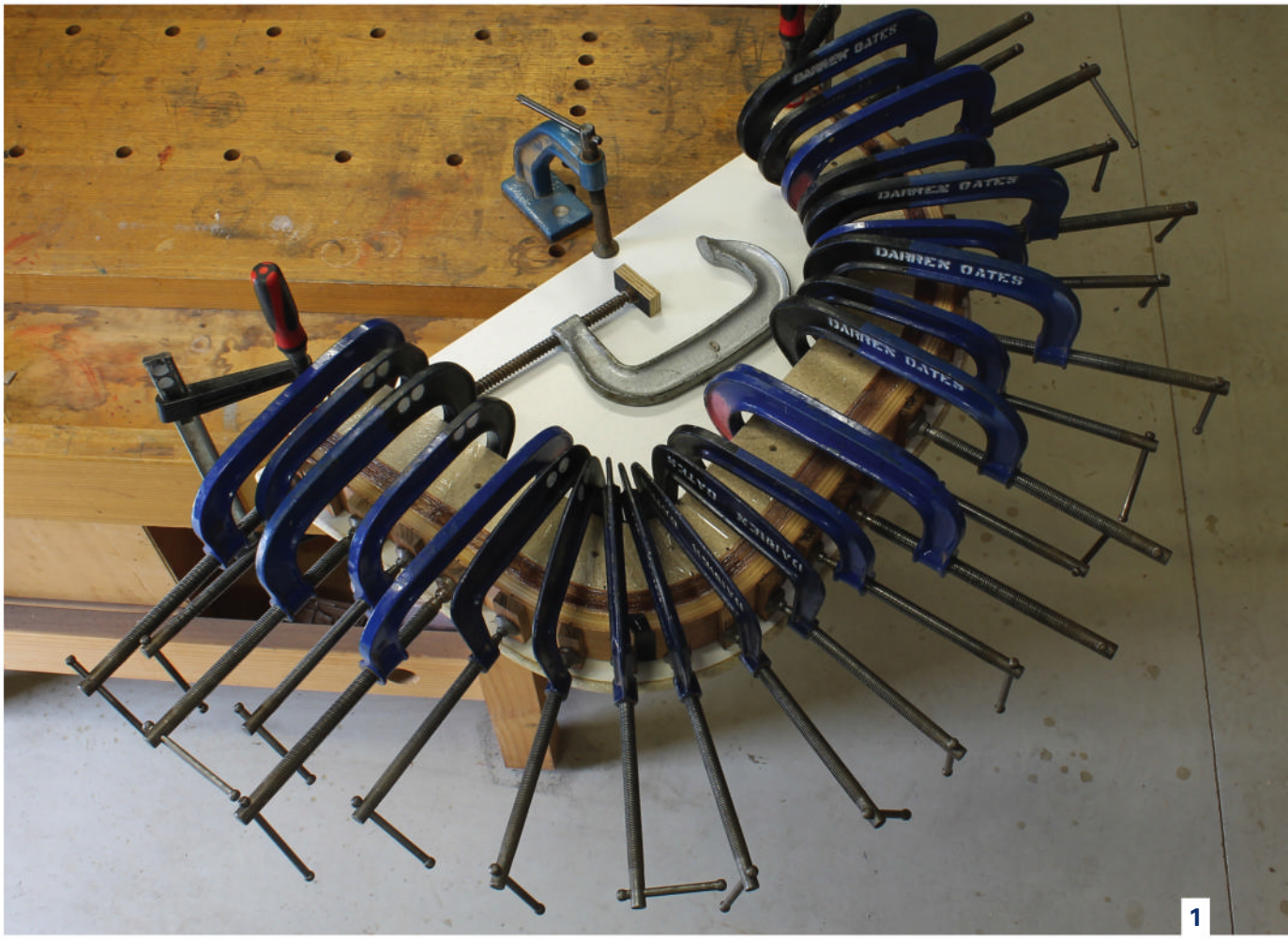
Since writing about making bent lamination jigs in issue 70, Darren Oates's methods and ideas on best materials to use have evolved.

A lot of the furniture I make features curved components. Over the past eight years I have made over 40 laminating jigs, some for one-off commissioned pieces and some that have been used over 100 times.

Over the years I have refined my jigs to the point where they are very durable, easy to use repetitively and easier to store when not in use.

In this article I'm not going to show the steps involved in making a bent lamination jig as I have already done this in *AWR#70*. However since writing that story I have discovered which materials are good and not so good for use in making these jigs. I have also perfected the packers that help press the lamination together to give you a smooth flawless finish.

The main components required for a successful bent lamination are curved jigs like the ones shown in the main photo, and the packers and G-clamps I'll describe over the page.



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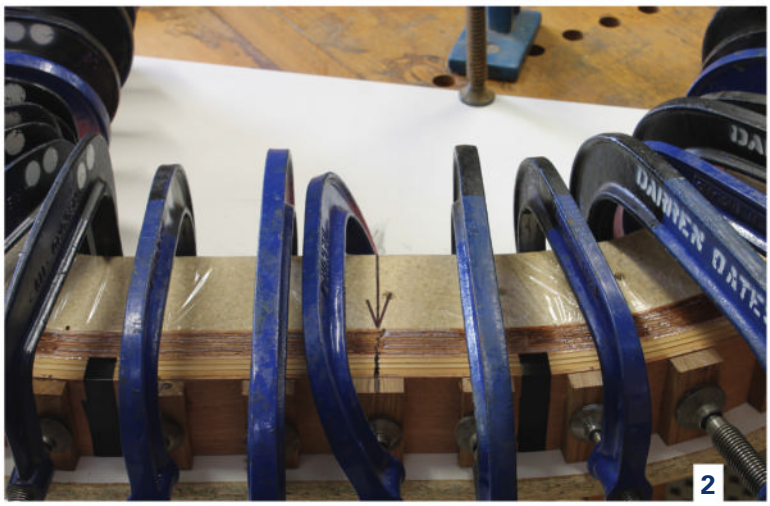

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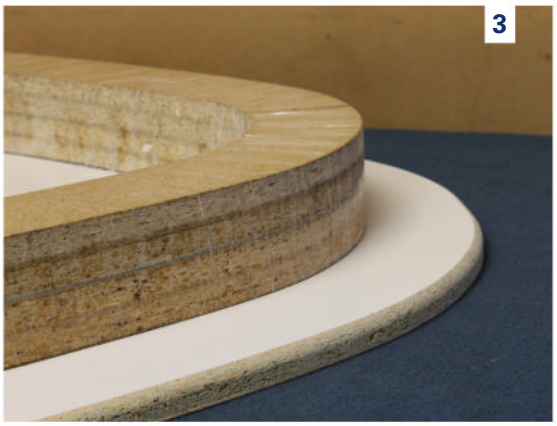
1. This photo shows how I clamp laminating jigs to the corner of my bench. F-clamps at each end, and one bench clamp give plenty of downward pressure to hold the weight of all of the G-clamps used to press the laminations.

2. I put a reference mark on my jigs to line up with the centre of the laminations. I mark the jig and the packers to ensure the laminations which have been cut to a specific length will always be clamped into the same position. In case you're wondering…my clamps are named for when I teach off-site!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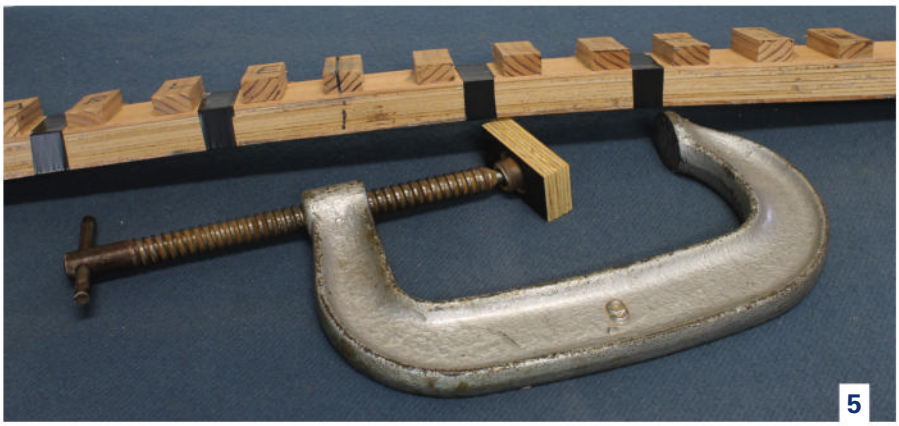
3. Close-up you can see the jig base is made from melamine. One advantage of this is that the melamine face is very durable and once waxed not even epoxy will adhere to it. The other advantage is that melamine is light in weight, very handy once you start making very large laminating jigs.

The wall of the jig is made from 16mm particleboard, much cheaper and a lot lighter in weight compared to MDF which can also be used in this situation. I have some very large laminating jigs which have been used for dining table legs and if made from MDF the total weight of the jig would start to become quite significant, especially when you work solo like I do and you have to hoist these jigs onto a benchtop for use.

In the past I used to wrap both the face and the wall of the jig in packing tape, however I found that over time the face got quite damaged which is why I switched to using melamine and waxing it before every glue-up. I give the face a quick wipe over with carnauba wax and have yet to have a dried set of laminations stay stuck to the surface.

To finish the base off, I router a radius to the top edge which stops any of the laminations from getting caught as they are being brought around from straight to a curve while being clamped to the face. The clear packing tape on the jig wall lasts for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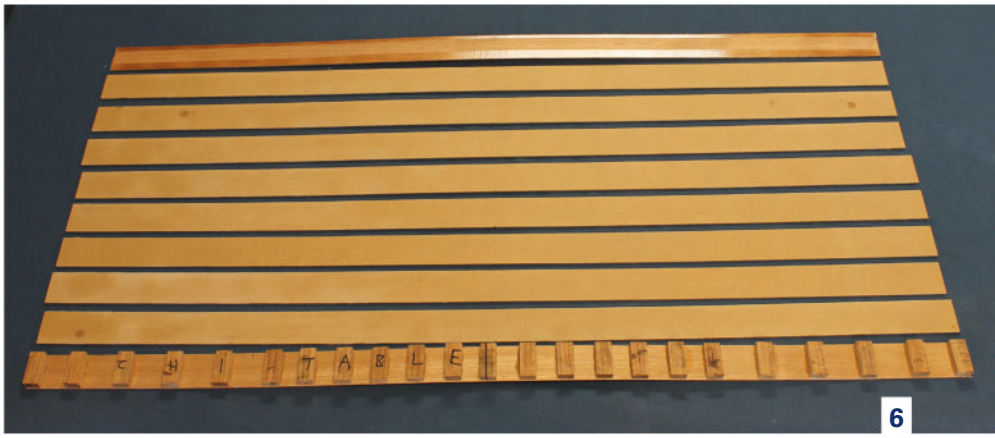
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a very long time and in a lot of my jigs has never needed replacing.

4. Looking underneath you can see I now cut the melamine to match the ends of the jig wall. This makes the jig a lot easier to store as it can be stood on its end. This may not be too much of an issue if you only have a couple of these jigs, but if you are like me and have nearly 50 you need to make storage of these as compact as you can. Another reason for making the base the same length as the jig wall is you can clamp it to your bench and have complete access around the edge of the base so you can use your G-clamp to align any stray laminations during the clamping process.

5. Showing the packer and modified G-Clamp. I use a forstener bit to bore a hole into a small piece of Formply so the round screw face of the G-clamp sits snugly in and won't fall out. I use this to clamp down any wayward laminations to the face of the jig. This allows you to get the maximum available width to your finished curved element.

6. Layed out from top to bottom (or inside to out) the packer has a hardwood strip covered in packing tape, eight strips of MDF (2mm for narrow curves and 3mm for wider curves), and a hardwood strip with vertical hardwood blocks to spread the load.

I highly recommend making a packer for each laminating jig. After several uses these packers start to retain the shape of the jig and you will come into a bit of bother if you use them on jigs that have completely different shapes. By having a set of packers for each laminating jig you can mark a permanent reference mark onto the packers to align with the mark on your jig. The idea of the packer is it spreads an even pressure over the length of the laminations during glue up and also eliminates flat spots from the clamps.

The inside face of the packer is covered in packing tape and the outside face has hardwood blocks glued on. I use insulation tape towards the centre of the packer to hold everything together. This tape is very strong and has the stretch to allow the movement required when clamped on curved surfaces. Do not tape the packers together towards the end due to the different radii on tight curves requiring the different layers to move against each other.

Using jigs and packers like these, along with an even pressure on your clamps, you should have perfectly aligned curved laminations that will be easy to remove from the jig and will result in a smooth surface to both sides of the finished piece. All of this equates into time saved cleaning and bringing this curved element to a final finished product.

Any technique or process you do on a regular basis will always lead to refinements and evolving solutions.

Darren Oates is a studio furniture maker in NSW who sometimes teaches workshops at Sturt School of Wood. Email darrenoates@gmail.com

Recycled Silky Oak Table

Using wood from some old doors presented some challenges, but the result was worth it. Story by Raf Nathan.

A whole pile of old growth recycled silky oak... I got it from a guy who was trying to clear his shed out. The good stuff too, *Cardwellia sublimis*, a northern Queensland species with a golden colour. Because of its stability, silky oak has traditionally been a favoured wood in Queensland for joinery work.

This cache was around 50 years 'old' judging by the holes left from the hardware. There were some small areas with rot, and of course nails and other debris.

The wood had formerly been used for doors so there were mortise holes and check-outs to allow for (**photos 1, 2**). Anyway I bought it, and got the boards back to the shed, first wiping and cleaning them up. The boards were all still quite square so they were put through the thicknesser to clean up the faces. This process did destroy a set of blades.

This table has to seat six to eight people so I was chasing at least 2100mm for the overall length of the top allowing at least 450mm per chair width. This dictates where the legs will be positioned.

Fig 1. Table construction (mm)

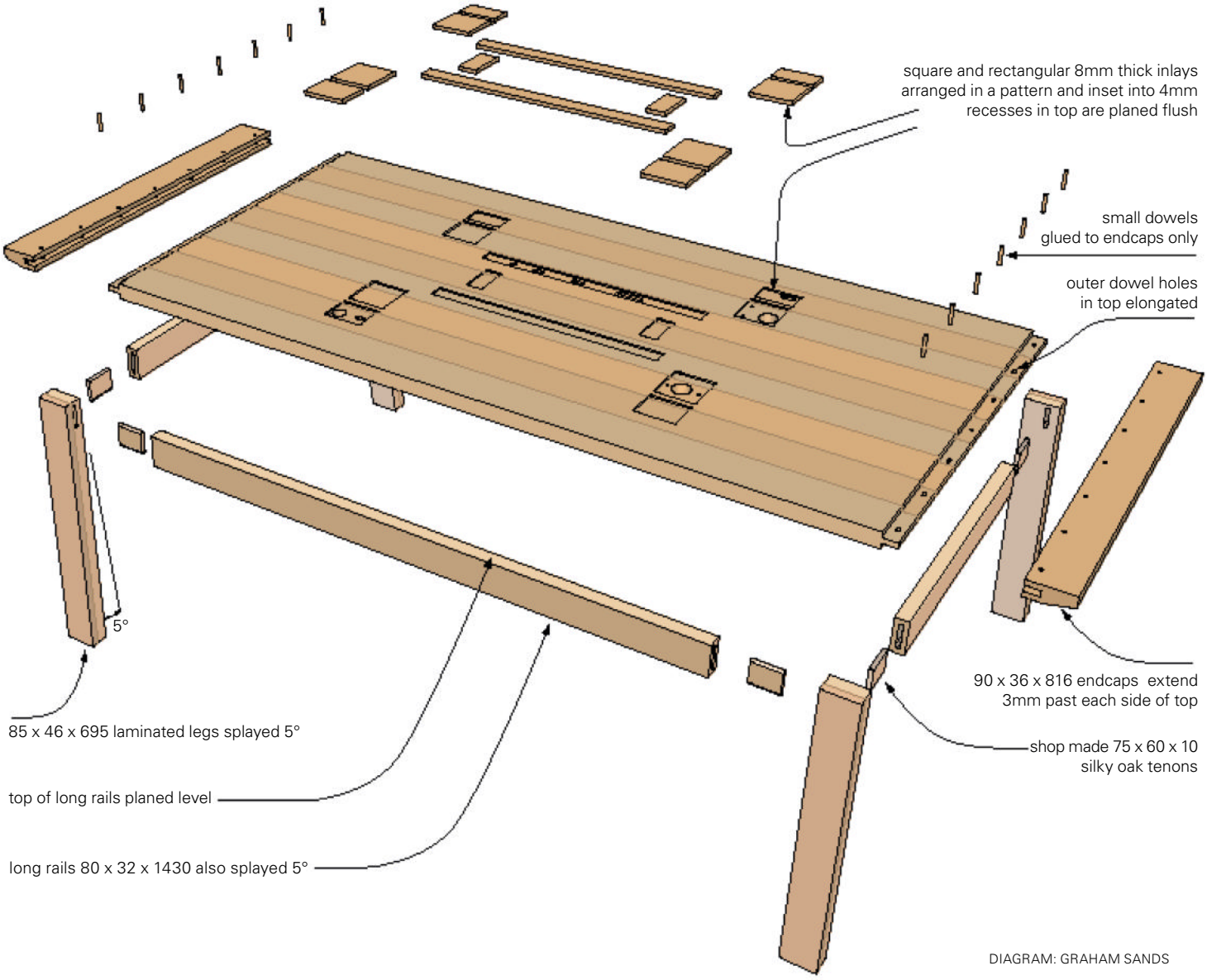


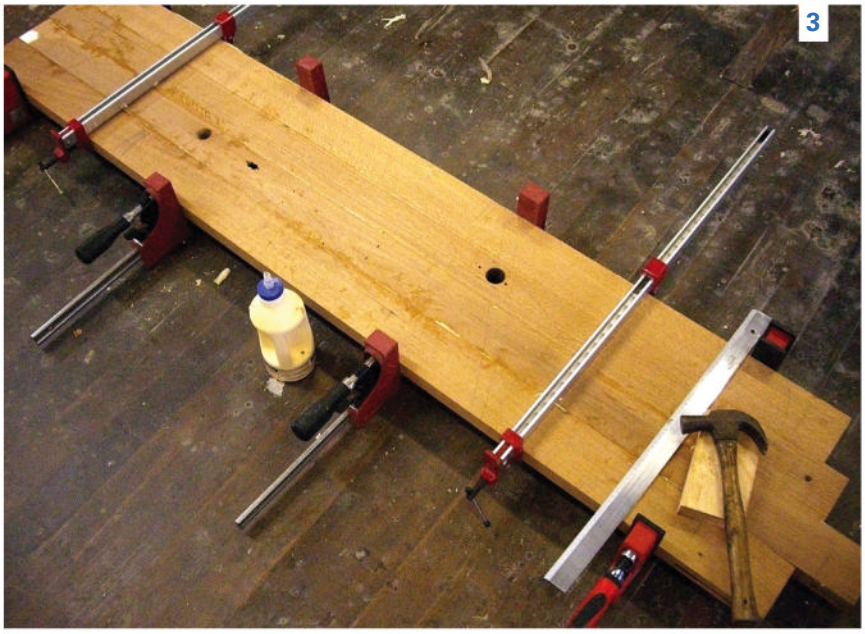
DIAGRAM: GRAHAM SANDS

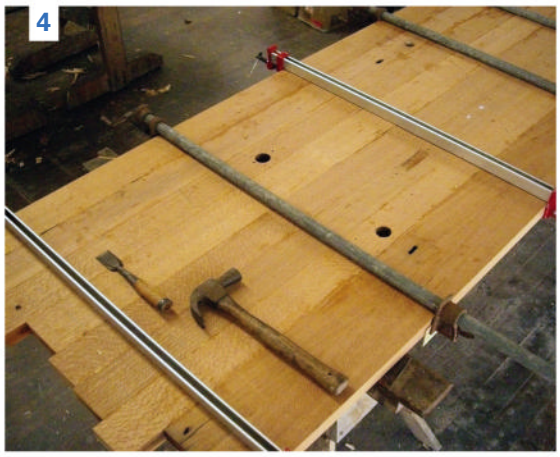
CUTTING LIST

Overall dimensions of the top are 1920 x 810 x 36mm

Top panel	1	1740	810	36
Endcaps	2	816	90	36
Legs	4	695	85	46
Rails	2	1430	80	32
	2	640	80	32

1. Nice dry wood...but the holes!
2. Machined boards laid out for best arrangement of grain and 'feature'.





3. The top was glued up in halves.

4. Final glue-up of the two panels.

5. Once the glue is dry it's handplane and belt sander time to smooth things out.

6. Showing one of the endcaps dry fitted to the top when the position of the dowels was being marked.

But when the waste and defects were allowed for after selecting the best wood, I ended up with an overall length of 1800mm or so. Needing more length I thought to breadboard the ends to achieve this. Adding on endcaps 90mm wide gave me a useable length of around 1920mm.

After double checking for nails the selected wood was square dressed. Of course there were a few small nails that slipped through.

The boards were sorted and juggled into a balanced arrangement with regard to grain and colour. However in this case, because there were holes and checkouts to contend with, there had to be compromises and also a strategy for dealing with them. I decided that having the holes spaced out symmetrically would help later on because I planned to cover them with inlay. Thinking about the inlay pattern that would emerge was important.

With the boards arranged and marked in their final positions the edges were jointed (planing was needed on the machine and then each edge was finally 'shot' with a handplane. There is no fast way for this if you want the best possible glued edge.

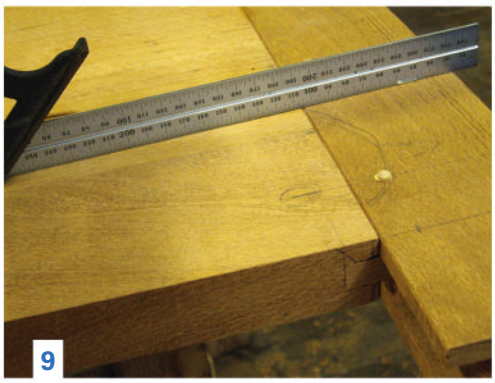
I used to glue up a whole tabletop in one hit, a rather intense process, the most intense part being to align the top faces as flush as possible before the glue sets. I've tried dowelling, biscuiting and dominoing the boards to help with alignment. What I have noticed is that biscuits are not that good. One table I made years ago has small openings on the edges only where the biscuits were positioned. Nowadays I don't use any of the above.

For this tabletop I first glued the top as two halves, a simpler process (**photo 3**). The next day I re-shot the joint between the two halves and glued these up. Gluing up the top as a three step-process was slower but quicker in the long run as I was able to align the board faces far better, reducing time later on when it came to levelling the surface (**photo 4**). When the glue was dry the faces were planed and sanded to smoothness (**photo 5**).

The breadboard ends

The big consideration here is you have to allow for wood movement or the whole thing will risk self-destructing. The endcap cannot just be glued across its whole length to the table.

Traditionally this is done by having a shoulder along the whole width of the top with longer tenons staggered across



7. Holes for dowels were drilled and the endcap removed. The endcap will be glued in the centre of its width, however the sides need to be able to move so the outer holes are elongated to give room for movement. Note: there was wood missing at one point on the tenon.

8. The end is glued on and dowels glued in place, however the dowels are only glued to the top and lower part of the mortise. No glue goes near the tenon.

9. Showing how the tenon fits into the end.

10. Sawing off the overhang on an endcap.

the width. The breadboard ends are then glued in the middle only with the edges able to move if needed.

In this case, because the recycled wood had holes, defects and some boards ended up short, I decided not to make individual mortise and tenons. One large tenon runs the whole width of the top, fitting in a matching groove in the endcaps. On some boards the outer corner lacked sound wood, so I had to set in a new piece of wood to become a tenon.

The tenon was made with a router taking multiple cuts from both faces of the top. The groove can be run on a tablesaw or router. I ran it the whole length, rather than making a stopped groove.

When these joints were completed, the assembly was dry fitted and dowel positions were marked and drilled (**photo 6**). The pieces were taken apart and the outer dowel holes were elongated to allow for wood movement (**photo 7**).

Before gluing the ends more work is needed. The top and endcaps were fine sanded and a small bevel handplaned on the edges of the ends and top before gluing them together.

Glue was only used in the middle of the joint. Small dowels were equally spaced along the endcaps protruding through the tenon. The dowels are glued to the endcaps but not the tenon (**photo 8**). Check that everything glues up as flush and parallel as possible (**photo 9**).

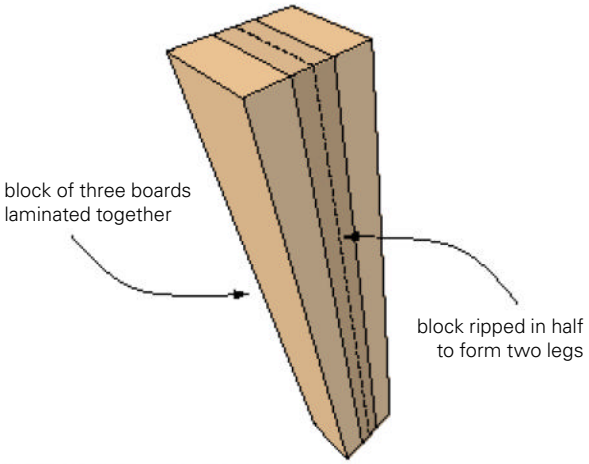
The endcaps extend past the top panel and need to be sawn back to leave 3mm protruding (**photo 10**). I did this by hand. There are a few ways to help you saw these straight and you can see them on a video we made that's on *Wood Review TV*[1].

The top panel needs detailing and a small bevel was planed and chiselled along all edges. You can do a lot of this with a router. Or as I thought, surely there is time to hand plane this small detail in. A chisel was used to bevel the exposed tenon fitting in the endcap groove.

Making the frame

The legs are splayed outwards which is very trendy at the moment. I happen to like the way this looks and decided to fit the legs at an angle of 5°. This does complicate the making process however.

Fig 2. Leg Preparation



11. Three pieces of wood were glued up to make a blank thick enough for two legs. This was ripped in half, exposing a bookmatched face.

12. This is where I positioned the legs!

13. Gluing up a short rail and leg assembly using two clamps to give a good balanced pull on the joints.

14. Squares and rectangles were inlaid in a pattern over the various holes.

15. Showing the finished endcap.

16. The pattern that was formed with inlay on the top.

My design has legs that are 46mm thick. Not having wood this thick I had to laminate some stock up, gluing three pieces of wood together to achieve a blank 90mm wide and around 100mm thick. With the glue dry the leg blank was sawn in half (**fig. 2**), giving me two legs with bookmatched front faces[2]. Having the grain flowing in the direction of the splay is a detail that most people will never notice (**photo 11**) but it does contribute to the overall look.

The position of the legs was then determined, remembering that a clear span of at least 1350mm minimum is needed on the long side to accommodate three chairs. Also this design works better with a good sized overhang of the top over the legs (**photo 12**). The joints used are mortise and tenon and can be done by hand or machine. This is the critical joint in a heavy table like this so spend time and care getting them perfect as possible.

I sawed the legs with a 5° angle top and bottom. The joint between the legs and long rails is straightforward however the short rail to leg join is at the 5° angle. This requires more time to set out and create.

I used a domino to make most of the joints. A small sliver of wood sawn at 5° was taped to the domino machine face to compensate for the 5° angle. Using the sliver made the joints line up parallel. Chiselling was needed to deepen the mortise.

Once the joints were completed the legs and rails were sanded and then the short rails and legs were glued up and left to dry overnight (**photo 13**).

The next day the final glue-up can be done. Because of the 5° angle, the inner edge of the long rail needs to sit proud of the top of the legs; this is then planed flush at an angle later on. Glue up the complete frame, checking for square and that the legs are parallel with each other.

Again things were left to dry overnight, and to strengthen the corners I glued and screwed large glue-blocks to triangulate the corners. The top is fixed to the base with wooden table buttons that allow for wood movement.

Now it's time to fix up the top – that is cover the holes with a pattern of inlay (**photo 14, 15**). As mentioned above, when I matched the boards I lined the holes roughly up to make it easier to create a covering inlay. I now decided on a number of squares and rectangular shapes to form a pleasing pattern.

I selected some 8mm silky oak stock that seemed to best match and cut the inlay shapes out from this. These were positioned over the various holes and a knife mark made around the inlay pieces on the tabletop.

Using a laminate trimmer with a straight bit set to 3mm deep removed much of the waste. This was followed up with a chisel and a router plane. The inlay was then glued in place and weighted down overnight. The protruding wood of the inlay was then planed and sanded level. In all, 12 pieces of inlay were used. While it's evident the top is made from recycled material, the grain of matched in silky oak creates interesting highlights.

Finishing off

Everything was sanded up to 320 grit in preparation for a hand rubbed oil finish. In this case I used three coats of Whittle hardwax oil with light sanding between coats.

Using recycled material can mean more time machining and matching, and compensating for checkouts or defects, but with planning you can get good results.

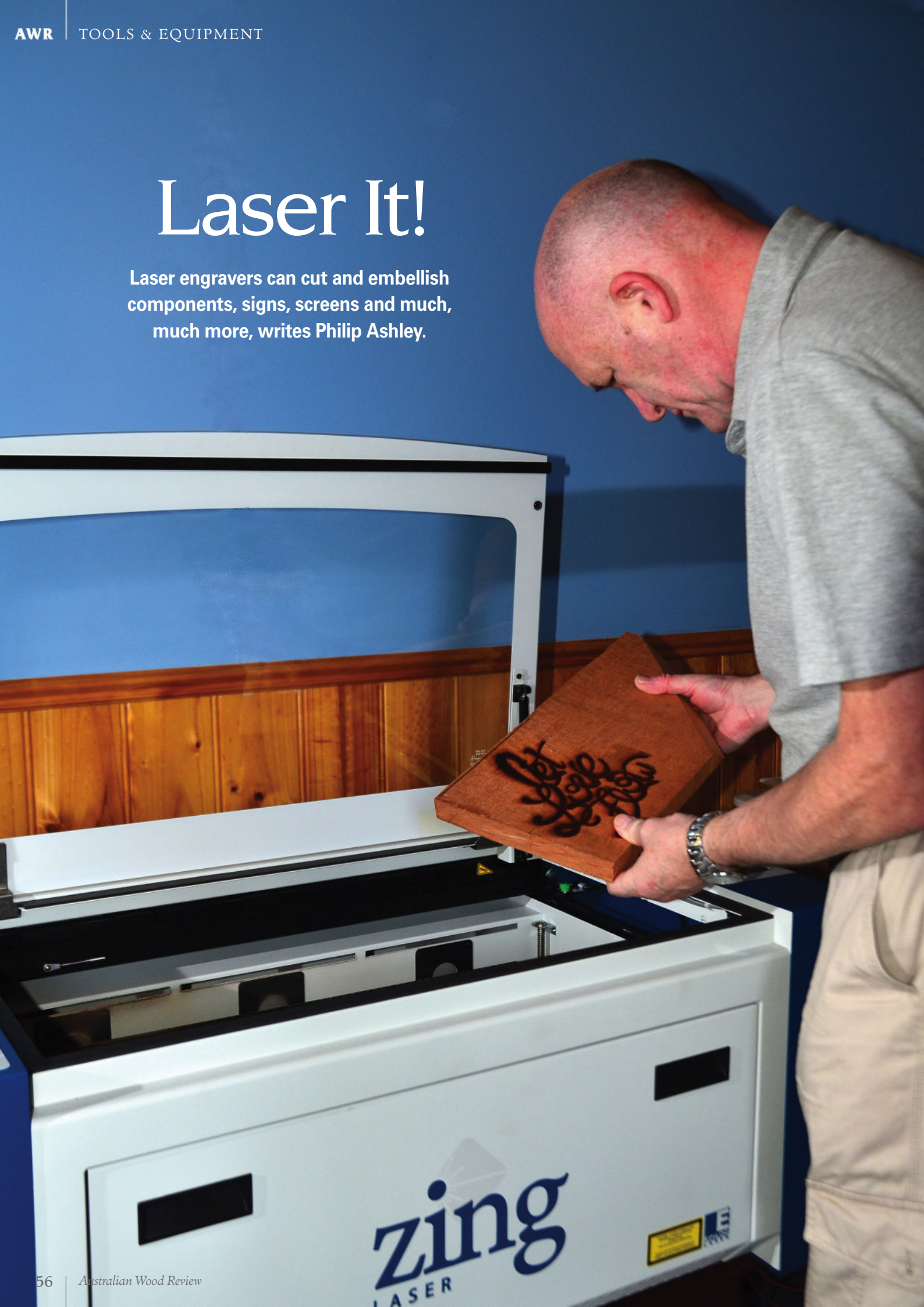
Photos: Raf Nathan

1. *The video referred to is 'Three Ways to Saw Straight with a Handsaw' on Wood Review TV (YouTube).*
2. *Another video 'Recycled Silky Oak Table: Making the Legs', also on our YouTube channel, shows part of this process.*

Raf Nathan is a Brisbane furniture maker and Wood Review's Tool & Equipment Editor. Email raf@interwoodshop.com.au

Laser It!

Laser engravers can cut and embellish components, signs, screens and much, much more, writes Philip Ashley.



Small-scale CNC routers have attracted some attention lately but there's another toy that has an even bigger following amongst woodworkers and other makers. Laser engravers are not cheap, but offer a huge range of new possibilities and hours of enjoyment. A bandsaw may be a machine you need, but a laser engraver is a machine you want. I was fortunate enough to have one delivered for a Wood Review trial and I can tell you – it's a heck of a lot of fun.

The Epilog Zing 24 from alfexcnc has a 40 watt laser and engraving area of 610 x 305mm. At around $15,000 it's a serious investment but there are no consumables, it takes up little space, and the possibilities are enormous. This machine is something you can play with every day and I guarantee you will never tire of its potential as there will always be something new to try out. Within a few hours of the alfexcnc technician leaving I had already decorated the cover of my iPad; engraved a set of wine glasses and even engraved a pack of shortbread biscuits for afternoon tea.

How it works

A laser engraving machine looks and operates like a big inkjet printer. There's a surface to hold the material and in the standard configuration this is a vertical box-like structure so the laser does not impact the table while cutting. The laser is usually housed in the body of the machine and a series of mirrors are used to direct the laser beam onto the work surface. The machine can't be operated without the lid closed. The overhead carriage moves the final mirror side to side while it slowly moves down the engraved object in an inkjet-like manner. Like a printer you also need a computer and software to manage the picture files and output to the laser engraver.

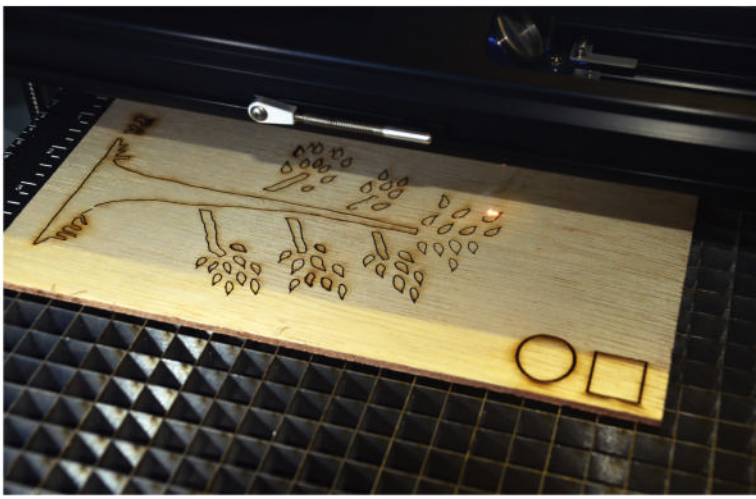
The computer doesn't need to be powerful; in fact I used my Ultrabook travelling laptop with an i3 (1.4GHz) processor and 4GB RAM running Windows 7 home premium. You will need a graphics software program and I used CorelDRAW (30-day free trial) although Adobe Illustrator or any similar program will do. You can even do a limited amount with Windows Paint. Now, I have to admit that my use of graphics programs is limited to cropping images and maybe a little retouching. Nothing to shout about, yet I was able to achieve some good results within a few hours including the monogrammed biscuits I spoke about before. It's the least frustrating piece of high technology I have ever used.

What you can do

The most common type of work done is engraving. You take a raster image such as a bitmap or jpeg that may have been scanned from a photo and engrave this onto your chosen surface. Engraving can be done on anything from fleece jumpers and wood to glass and even steel. At one extreme the laser will burn into the material and at the other, merely leave a surface mark.

The appeal of this machine is that (like a video game) it takes a 'moment to learn but a lifetime to master'. During my time with the Epilog Zing I tried various solid timbers; plywood, synthetic marble, glass, leather and food (my biscuits). I might add with various degrees of success, but each was a learning experience and all were entertaining.

You can also cut out shapes and for this you need a vector image. This is a line drawing that is actually a series of mathematical calculations of line or arc start



Opposite page: Philip Ashley had the Epilog Zing 24 on loan for a one-week trial period.

Top: An A4 sketch was scanned, the raster image converted to vector and then lasered in little over half an hour.

Above: Various test pieces, including the author's iPad cover...and a biscuit.

and end points. If you enlarge a raster image you enlarge the pixels and lose definition. If you enlarge a vector image the lines appear exactly the same thickness. Vector images are used in CNC woodworking and also to cut shapes using a laser machine. You can have a file with both raster and vector graphics to both engrave the surface and cut through the part.

I was sent eps and pdf formats of Interwood's SuperSquare to laser. Within half an hour I was able to identify the lines to be cut (vectors) and the lines to be engraved (rasters) and send the file to the laser engraver. The job took about half an hour to run with the raster elements (writing and ruler marks) done first, followed by the vectors to cut through the plywood.

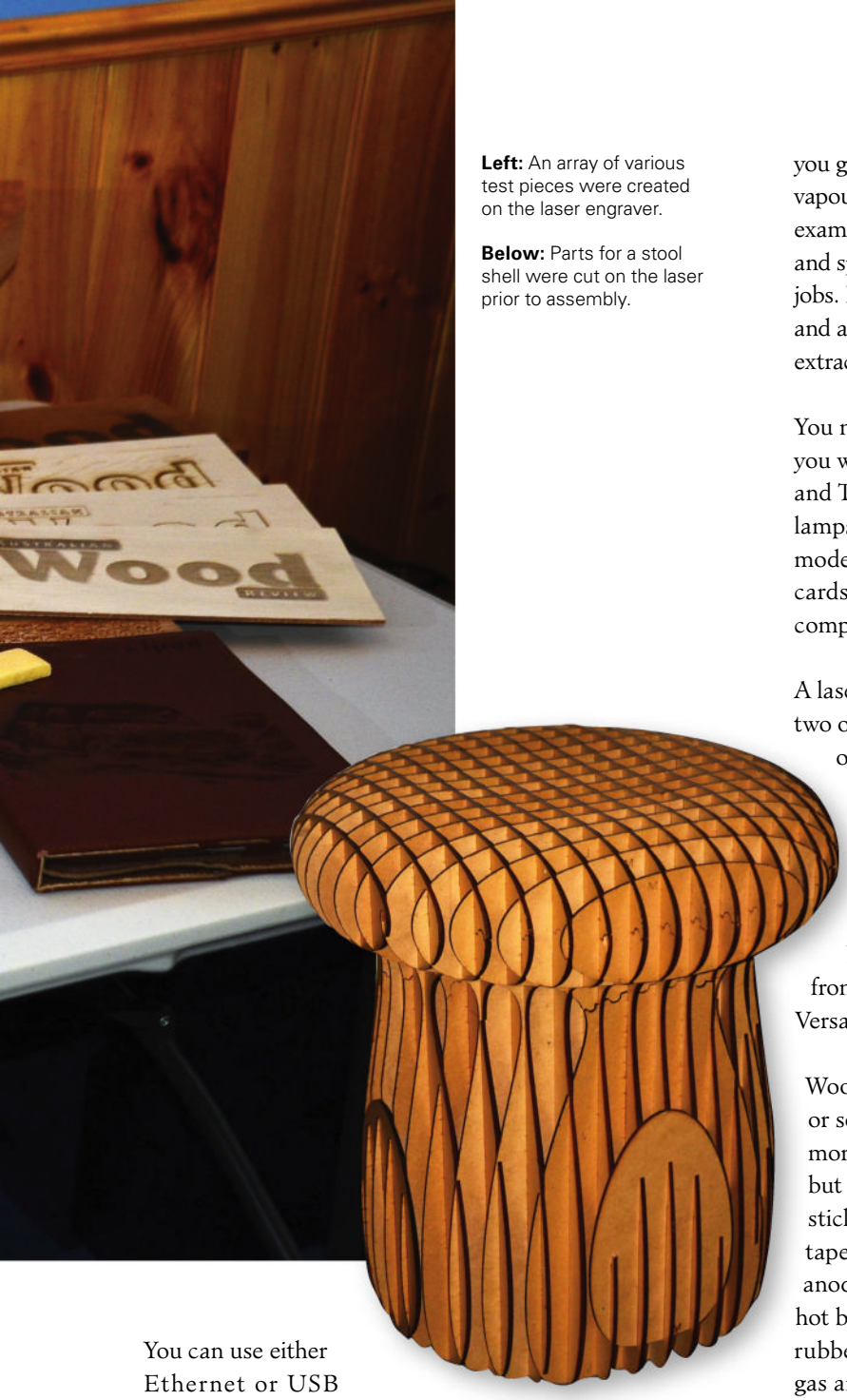
I also tried my own artwork; a tree with trunk, branches and leaves. I did not join the branches to the trunk or the leaves to the branches so I could cut them out while leaving the panel intact. I drew it with a pen on a piece of A4 paper. Because it was drawn with a pen, the resulting scanned (raster) image contained lines made up of pixels. A simple function on the software allowed me to convert these to vector lines and send this to the machine. My small laser cut screen came out very well and from drawing to finished product took a little more than half an hour.

The controller

This is the software you will be using. With CorelDRAW I was able to draw objects or write text and also import files from my laptop.

You first set the size of your project, then type in the material size and move the picture onto the part, scaling if necessary. Select the parts to be cut through and set these to the hairline setting. All other parts will be engraved with the lightest colours least engraved and the darkest colours the deepest.

Next, go to the print icon and set the same material size, the DPI (quality), raster or vector (or both) and the speed and power of the laser. Select the laser engraver to print and the file is sent to the machine with the name you saved the file as.



Left: An array of various test pieces were created on the laser engraver.

Below: Parts for a stool shell were cut on the laser prior to assembly.

You can use either Ethernet or USB connections to send the file to the machine. Whatever you see on your computer is what you will get on the laser engraver. The machine suppliers offer some free files and you can buy laser programs from internet suppliers such as www.gantryco.com.

The machine

The Epilog has a small control panel with go/stop and pause functions. A one-line screen displays the programs in the memory and the time elapsing. A focus button allows you to set the focal point of the laser by either raising or lowering the table until a spring-loaded pointer touches the top of the workpiece. You can adjust power or speed and also deploy a red-dot pointer to establish a start position. Usually though, the start point is top left of your image.

On the Epilog Zing I found the laser focal point to be quite broad and was able to engrave the surface of a curved wine glass without the optional rotating attachment. The results you get depend on the material used as it either heats up and vapourises (burns) the surface or in some cases (with glass for example) fractures it. The effect gained depends on the power and speed used and you can save the settings for successful jobs. Depending on use, the machine requires a weekly clean and an annual service. A compressor is required along with an extractor to remove the noxious fumes.

You might think that a laser engraver has limited use but you would be wrong. What about laser printing jackets and T-shirts, your favourite coffee mug, bottle openers, lampshades, cutting boards, your iPad or iPhone, wooden models, gift cards, shoes, plywood bird houses, business cards, gun stocks, rulers, screens, furniture prototypes and components, decorative panels, decorations and more?

A laser engraver is unlike other workshop equipment. No two operations will be exactly the same and what comes off the machine is usually creative and extremely satisfying. I bought one a few years ago for my TAFE department and it was an instant success with the apprentices, initially for football and car logos but later for decorative finishes on furniture pieces such as corbels and finials. Our Epilog trial machine was both brilliant and faultless but you can also try Red Sail from www.beyondtools.com.au, Trotec, Origin, Red Dot, Versa Laser, Gravotech and the DIY Laser Blade.

Wood can be engraved with a low power laser of 10 watts or so but 40 watts is a better buy as it can do so much more. Walnut, mahogany and maple engrave very well but all timbers are suitable. Resinous woods may leave a sticky 'halo' which can be eliminated by applying masking tape to the surface of the wood. You can also laser acrylic, anodised aluminium, brass, glass, leather (engraves like hot branding), stainless steel (marking only), melamine and rubber. Be aware that vinyl and PVC can produce chlorine gas and should not be used on a laser engraver.

For me, the Epilog laser was a ton of fun. In the week I had it I was able to produce some pretty cool pieces. There were times I used too much power and cut too slowly and this resulted in more burning than engraving. This technology is all about experimentation and while the suppliers give you all the information you need to make a great start, there's nothing like experience. Of course, it also has its serious side and there are plenty of examples of commercial and contemporary furniture made with this technology. There's a place for a laser engraver in any wood shop and if you can afford it, you'll love it.

Photos: Philip Ashley

Review machine from alfexcnc, see www.epiloglaser.com, phone 1300 201 510

Philip Ashley is AWR Machinery Technology Editor. Email philipneilashley6@bigpond.com

Craig Thibodeau in his San Diego, USA workshop.

Complexity Concealed

With sleek lines and concealed movements, Craig Thibodeau's lastest piece is a masterpiece of complex functionality. Story by Linda Nathan.

In a recent radio interview, US maker Craig Thibodeau claimed that he makes to suit his clients' needs and doesn't attempt to create heirloom pieces. With the level of intricacy and fine detail his work generally involves however, it's certain that that's indeed what he does. 'If someone came to me and asked for something to last 200 years', he admits, 'the only thing I would probably do differently is to use hide glue. Everything else is already done in a way that would last.'

The latest bespoke piece to leave his workshop is his *Automoton Table* which has a rise and fall top, and a myriad of gas-powered drawers and secret compartments. The look of the table is Art Deco inspired and was made to match in with a piece previously made for the same client.

'It started out as just a table – initially the client wanted the top to move up and down but then we kept adding functionality to it,' Craig said. With a background in mechanical engineering and consumer product design, Craig does his design work on the computer. This enabled 3D modelling of components and their movements, allowing for 'collisions' and modifying accordingly. Around 200 hours was taken up with the design of this piece alone.

The mechanical movements within the table are inspired by the work of 18th century master furniture makers Abraham and David

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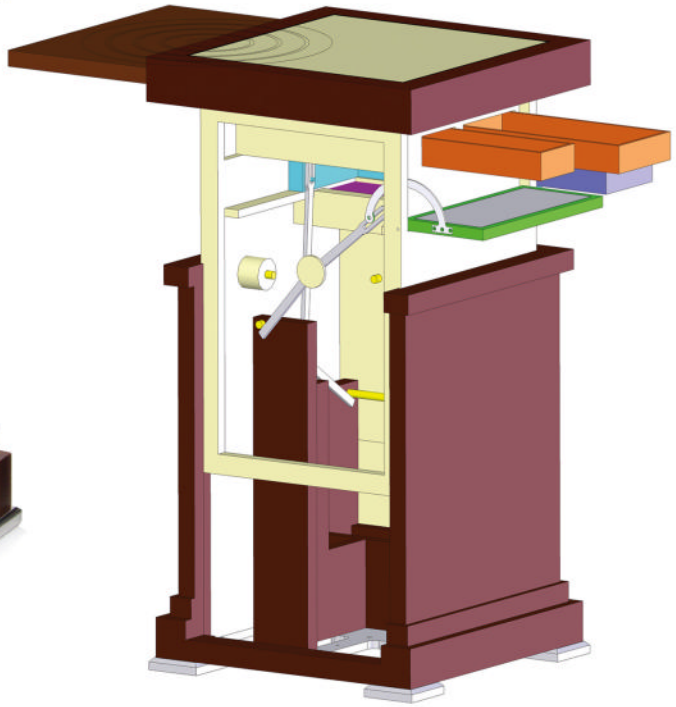
1. Closed, the complexity of the *Automoton Table* is concealed.
2. Pressing downwards on the top triggers the primary gas piston which activates the rise mechanism. Steel pins with plastic bushings make contact with the pivot arms and as the box rises, the arms push the drawer box forward. As the box moves down, the pivot arms bring the drawer box back inside, this is assisted by a few coil springs attached to the back of the box.
3. The table fully open. Most of the fittings are concealed. The bottom plate, pivot arms, stainless tray and stainless feet were CNC-cut to Craig's drawings. The tray, curved hinge arm and feet were then polished to a mirror finish. Many screws, pins, springs and pistons are off the shelf hardware from McMaster Carr. High load touch latches and pushers are from St Louis Designs, a yacht hardware company in the US. All of the spring loaded buttons and drawers (except for one) are pushed out by Blum Tip-On door openers.

   The pivoting tray is more complex. It is hinged at its base and pivots around the hinge pins as the curved arm on the side rotates forward. That arm is moved by another pivot arm inside the case which is driven up when the main body rises. The pivot arm makes contact with another steel pin sleeved with a plastic bushing and rotates the tray down as the box rises. When the box lowers the movement reverses and is again assisted by a coil spring attached to one of the pivot arms.

Below: One of Craig's working diagrams.



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4. There are nine secret items including a puzzle tray, six drawers (one has a hidden compartment), a magnetic key, and a hinged lid. The cabinet is made of manmade substrate veneered in Brazilian rosewood, quilted maple, maple burl, maple, Gaboon ebony, macassar ebony, and mahogany.

5-6. The circular table puzzle has five rings of parquetry glued to a three ply veneer backer that is glued to a series of 1/16" thick aluminum rings. These have threaded nuts attached underneath. The rotation is done with five different sized aluminium lazy susans that have been drilled for fasteners going both up into the aluminum rings and down into the wooden framework.

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Roentgen, although Craig considers the *Automoton Table* to be simple by comparison.

A 21st century touch is the 125lb gas piston mounted on a ½" thick aluminium plate secured to base of the outer carcase. The top of the piston presses against a series of support arms crisscrossing the interior of the inside box. To hold the mechanism in the down position there is a high load touch latch secured to the inside box and the bottom plate which is rated for 200lbs continuous duty.

The moving parts are all-wood except for the low-friction custom made ¼" CNC-cut aluminium levers, stainless steel pins and plastic bushings in addition to some off the shelf items.

Designed and made over a six month period, the table took 400 to 500 hours actual build time, with a considerable amount of that occurring in the finetuning stages. The hardest part was ensuring its functionality, allowing for friction and wood movement so parts would open, close and slide smoothly.

Craig works mainly to commission and charges around $US35,000 for a piece like this, but also makes a few pieces for Dovetail Collection, a gallery in northern California. You can see the cabinet in action on YouTube, search for CT Fine Furniture. See more of Craig's work and contact him via his website ctfinefurniture.com

** Art Deco Table with Trompe L'oeil Interior*

Photos: Craig Carlson

Readers may remember stories on marquetry and parquetry written by Craig Thibodeau in issues 68 and 73. These stories are also now on woodreview.com.au, look under the how-to menu.

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Radial Edge Frieze

How to create a decorative veneer edging for your curved projects.
Story by Damion Fauser.

In AWR#83 I wrote about creating a radial starburst match, taking you as far as edge gluing up its 12 triangular-shaped segments. This article continues the journey by adding a contrasting radial border called a frieze to complete a highly decorative circular tabletop.

I'll take you through the setup for pressing the panel, applying a solid border to conceal the core material of the panel and finally, a solid inlaid strip to further define the transition between the central radial match and the outer border. I will also draw on some of the processes I wrote about last issue in *Drawing and Fairing Curves*.

Templates to make

For the edge frieze you will need to make a series of jigs and templates, all revolving around the precise cutting of circles and circular segments that are all concentric, and in some cases where two separate elements have perfectly mating outer and inner radial profiles.

You will need a design, from which you can determine several key radial dimensions. Firstly, you'll need a dimension for the radius of your central radial match element. Secondly, you'll need to know the outer dimension of your completed tabletop (sans solid edging at this stage).

Circle template. Using your router trammel arm, make two circle templates, one for each dimension. Use a ¼" router bit shank as the pivot point for your router trammel as the resulting hole through your circle templates will become essential later on.

Frieze template. This is for cutting out the frieze elements, which will be fixed to the inner circle with veneer tape for pressing. Using the technique I described to cut an inner radial profile, use the router trammel to make a short segment of ply or MDF with an inner radius that is exactly the same as the outer radius of your central radial match element.

Draw a full scale diagram of your finished tabletop profile. Use this to locate the resulting inner radius of your small piece on the outer perimeter of your inner radial match and then trace some radial lines out from the centre of your circle to define the outer edges of your template piece.

Extend these radial lines out beyond the outer perimeter of your table diagram and draw another curve as the external perimeter. This additional distance will ensure you have some waste to remove after pressing the whole panel. Test this element by running it around the inner circle template, you should have a seamless joint between the two templates (**photo 1**).

Use this completed ply template to make a copy in some 3mm acrylic. The acrylic will make it easier to see that you are cutting the frieze elements with the correct grain orientation for a true radial grain pattern.

Cutting the inner circle

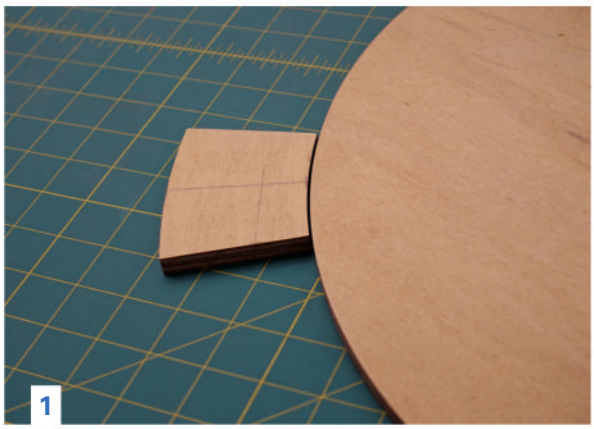
Take the circle template for the centre radial match element and lay it over your radial match veneer assembly so you can see the very centre point of the radial match through the ¼" hole that is the centre of your circle template. Using a scalpel or a sharp knife, gently scribe around your circle template to remove the waste and leave a circular radial match (**photo 2**).

Cut and attach the frieze

Use the acrylic template and a knife to cut out the frieze segments (**photo 3**). Some abrasive fixed to the underside of the template helps keep it in place whilst scribing.

For a true radial grain pattern, you'll need to keep your frieze template fairly narrow so there is straight grain across the whole width of each segment. For this 650mm diameter tabletop, I needed 23 frieze pieces to go the whole way around.

Use veneer tape to attach each segment to the starburst match, and to the frieze segments next to it (**photo 4**). If necessary, use a small piece of MDF as a platform and a block plane to shoot the edges for a mating fit between each piece (**photo 5**). Scribe the last piece to fit when all the others are taped on.



1. The circle and edge segment templates should mate perfectly.
2. Using the template to scribe the centre starburst match into a perfect circle.
3. An acrylic template lets you line up the veneer grain when cutting out pieces for the edge frieze.
4. Attach each frieze piece with veneer tape.
5. Shooting the edges of the frieze pieces for a seamless fit.


6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Prepare for pressing

Prepare your core material, top and bottom cauls and some scraps of veneer to loosely cover the exposed triangular areas at the corners of your square core panel. Prepare a backing veneer of your choice. Remove any residual blue tape from edge-jointing your radial match profile, apply the adhesive of choice and press.

Post-pressing

Once your panel is out of the press, remove the veneer tape and then use a card scraper to remove the bulk of any glue bleed-through (**photo 6**).

Take your outer circle template and, again using the centre hole to align the template over the very centre of the pattern, trace around with a pencil (**photo 7**). Cut this out at the bandsaw, leaving about 1–2mm of waste to be removed (**photo 8**).

Fix the outer template down with some double-sided tape and remove the waste with a bearing-guided bit at


8

the router table (**photo 9**). I find that the spiral compression bits are ideal for this task as they minimise the disruption to the fragile veneers at the edge of the core.

Solid inlay strip

To highlight the transition between the centre pattern and the border, I like to cut in a strip of solid wood. First you'll need to make a jig.

Using the technique I described to cut an inner radial profile, use the router trammel to make a short segment of ply with an inner radius that is exactly the same as the outer radius of your finished tabletop.

Make another piece of ply that has the hole pattern for fixing to the base to your router. Load a 3.2mm straight bit into your router and then fix the two pieces of ply together so that, when the inner-radial piece rides against the outer perimeter of your project, the router bit runs directly over the line between the centre pattern and the radial border (**photo 10**).

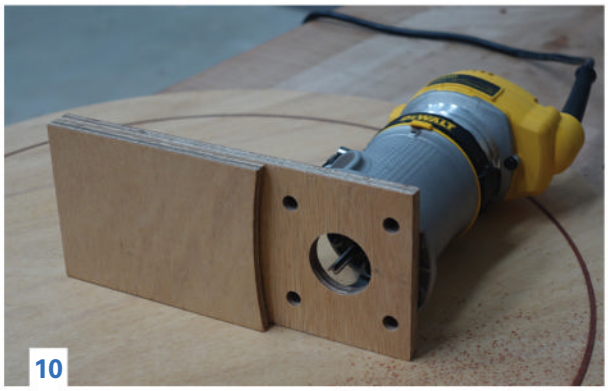
Set the bit to cut to a depth of 2mm, register the jig against the tabletop and gently lower the spinning bit down to the work. Slowly work your way all the way around around the piece (**photo 11**).

To machine the inlay, use a zero-clearance base at the bandsaw to cut some thin strips at around 4mm thickness (**photo 12**). Mill those strips down to 3.2mm using a supplementary base in your thickness planer and then reset your bandsaw fence to cut square-section inlay strips, again using a zero-clearance base.

To maximise your stock, make a basic jig to use a block plane to remove the bandsaw marks from the rough edge so you can present a dressed edge to the bandsaw fence for each pass (**photo 13**). Mine is just a narrow strip of MDF with a series of tablesaw kerfs at various depths, with a small scrap of 3.2mm stock glued in the end of each groove to act as a stop.

6. After pressing, remove the veneer tape and use a card scraper to remove glue bleed-through.
7. Using the outer template to trace the external perimeter.
8. Remove the bulk of the waste at the bandsaw.
9. Using the outer template, flush-trim the remaining waste away for a perfect circle.
10. Jig for cutting the recess for the inlay strip. The inner radial profile rides neatly around the external perimeter of the circular tabletop.
11. Routing the recess for the inlay strip.
12. Using a zero-clearance base at the bandsaw to cut thin strips for the contrasting inlay.
13. The author's jig for edge-planing thin strips.


9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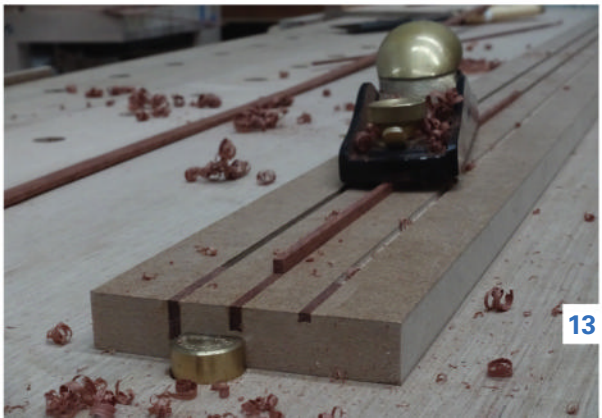
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Cut one end of your completed strip square and use a syringe to apply some glue to the recess in the tabletop (**photo 14**). Gently work the strip into the recess (**photo 15**), noting that, just like coiling a garden hose, you will need to apply some rotational pressure to the strip as you work your way around the circle. Use a Japanese saw to trim away the waste and firmly push the end home (**photo 16**). Use an old ruler or card scraper to remove excess glue and leave it to set (**photo 17**).


15

As you cut the recess 2mm deep, you should at this stage have approximately 1.2mm proud of the table surface. You can flush this down with a combination of handplanes and card scrapers, but this takes some nerve and a very thorough understanding of what your plane irons are doing in relation to the stock. I have one plane with a cambered blade and set for an extremely fine cut for the final few shavings (**photo 18**).


16

Alternatively, you can use the jig made for cutting the inlay strip to flush the majority of the waste. Just adjust the depth of the bit so that, as the jig runs on the project, the bit just skims the surface and levels the waste. Test this on a scrap first (**photo 19**)!


17

Solid edging

Machine some strips of your chosen stock to 3–4mm thickness and for the width, a little over the thickness of your panel piece. Use the formula π x diameter to determine the approximate length of your strips, noting that you'll likely have some snipe at each end and will need approximately 100–150mm of overlap for some glue surface area when you wrap the strips around, so factor that additional length into your processing.

Saw the snipe away from one end and prepare a scarf joint. Do this by setting a block of solid scrap wood in your vice and clamping your strip onto it. Use a block plane to take progressively longer stopped cuts to achieve a taper that is 100–150mm long and terminates in a knife-edge at the end (**photo 20**).

Get everything ready to glue on the solid edging. This includes an extra set of hands as this simply cannot be achieved on your own. You'll also need some timber wedges and a ratchet tie-down strap with the hook removed from the long end and the resulting tag attached to the body of the strap. This will be used to apply firm and even clamping pressure to the edging whilst the glue cures. Position the wedges under the strap near the buckle in opposing pairs.

Once the glue has cured, use a Japanese saw to remove the loose tag end (**photo 21**), then a spokeshave or block plane to level out the area over the scarf joint (**photo 22**).


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Finishing off

Use the techniques previously described to flush down the edging overlap to the surface of the tabletop. Use card scrapers and light abrasives to prepare the resulting surface for finishing. Remove any glue residue from the edge of the applied solid edging and gently soften the edges of the piece.

Once you are confident that all is in readiness, apply your finish of choice. I find that penetrating finishes aren't that compatible with commercial veneered surfaces so for smaller projects like this I typically apply 10–12 coats of a very weak blonde dewaxed shellac and then a coat of wax (**photo 23**).

Nothing in this project is beyond the reach of the average woodworker with some basic skills and tools. An understanding of basic veneering processes, and of the inter-relationship between the various inner and outer radial profiles used in the jigs and templates involved are all it takes. Give this a go to make your next project really stand out.

Photos: Linda Nathan

Damion Fauser is a furniture designer/maker who lives in Brisbane. He teaches woodwork from his Darra workshop. Damion served in the RAAF for 20 years and also has a degree in maths. Email: damion@damionfauser.com.au

14. Using an equine syringe to apply glue to the inlay strip recess.

15. Gently press the inlay strip into place.

16. Sawing away the excess length before pressing the end finally home.

17. Removing glue squeeze-out.

18. A series of handplanes can be used to flush down the inlay strip.

19. Another way to flush down the excess is with the router jig.

20. Long, tapered surface of the scarf joint should terminate in a knife-edge.

21. Cutting away the loose tag from the scarf joint after the glue has cured,

22. Using a spokeshave to fair out the surface in the vicinity of the scarf joint

23. Worth waiting for – the end result after the second coat of shellac!

21

22

23

What's The Rub

It pays to understand basic technique principles, says Richard Raffan.


1

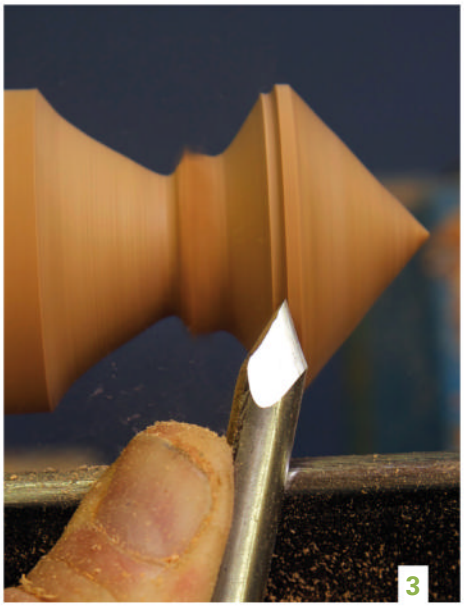

2

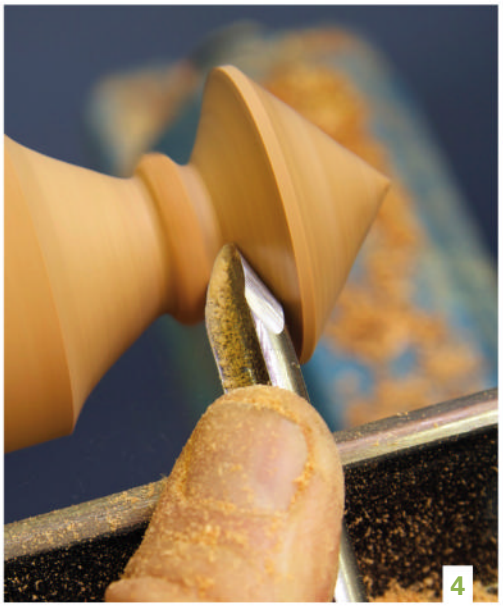
Those who are new to woodturning are constantly being advised to 'rub the bevel' when using gouges and skew chisels, and this seems a simple enough instruction. But very recently a beginner complained to me that, although he was constantly being told by people trying to help to 'rub the bevel', he had no idea what this meant.

When some people don't understand what they are being told they often don't like to ask for clarification for fear of ridicule or being thought dense. Usually the problem lies not with the student but with the teacher's inability to explain the point in terms that particular student can understand.

Bevel rubbing is essential if you hope to achieve a smooth surface off a skew chisel making a planing cut, or a gouge. It's easiest to see what's happening with a gouge.

In **photo 1** you can see the difference between a having a bowl gouge bevel rubbing (to the right), and not rubbing (to the left). This is on a bowl profile (the outside) with the wood grain running at 90° to the lathe axis; consequently



both tools are cutting from the smaller to larger diameter. For the smoothing shear cut to the right, you need to ensure the bevel maintains contact with the wood as the cut proceeds.

The result should be a smooth surface devoid of the ridges you see between the two tools. When the bevel is in contact with the wood you can use the bevel heel as a fulcrum from which to adjust the precise position of the edge as it cuts, and therefore the thickness of the shaving.

When you ease the end of the tool handle away from the wood, you take a heavier cut. When you ease the handle towards the wood, the cutting edge pivots on the bevel heel for an ever-lighter cut until it's clear of the wood and ceases to cut. If the surface the bevel is in contact with is smooth, that surface helps to jig the tool as the cut proceeds.

If only the nose of the tool is contact with the wood, as with the left gouge in **photo 1**, the wood will often be cut cleanly, but it will ridged as it is between the two tools. This because the fine control gained when the bevel is rubbing is missing.

A push cut, to the right in **photo 1**, offers more directional control as the cut proceeds, but the tool can be used for a pull shear cut as in **photo 2**. Here the bevel is against the wood, but there is less control than with a push cut because the tool is pointing up into the oncoming wood and the blade is almost 90° to the surface being cut. You will usually have a better chance of cutting a smooth and flowing curve when the tool-blade is at an angle to the surface being cut.

The bevel doesn't need to be forced against the wood. The ideal pressure for the bevel against the wood is similar to the pressure between your hands as you rub them under an air-dryer. The less tool pressure there is against the wood as a cut proceeds, the better. If you push the tool against anything, it's down on to the rest. You want the tool held firmly in position as the wood comes to the cutting edge.

On spindles (when the grain lies parallel to the lathe axis), all cuts should be from larger to smaller diameter and therefore push cuts. In **photos 3** and **4**, you see a 3/8" spindle gouge. To avoid a catch as the nose of the tool enters the wood, have the tool on its side with the bevel aligned in the direction you want to cut.

Start with the handle dropped below horizontal, then as you raise it, the edge pivots into the wood, cutting a surface for the bevel to rub. Once the bevel is rubbing you can roll the gouge a few degrees so the flute starts to face up. Take care not to roll the tool too far because there's a nasty catch waiting if the wood bears down on the unsupported upper wing.

At the end of a cut into a corner or groove, roll the gouge back on its side to avoid a catch with the lower wing, **photo 5**.

The same applies to skew chisels, but I've yet to find a way of showing you a skew bevel in contact with the wood. If your skew bevel isn't rubbing the wood the tool will judder slightly as the cut proceeds and you'll have a cleanly cut but ridged surface not unlike that between the two tools in **photo 1**.

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

Five Fun Ways to Curve Wood

How to get your woodworking off the straight and narrow. Story by David Howlett.

Many of us start our journey in woodworking producing designs with dead straight lines and easy to produce 90° joints. Once a woodworker starts to experiment with curves, they find out how much more interesting a design can become with the addition of curved components.

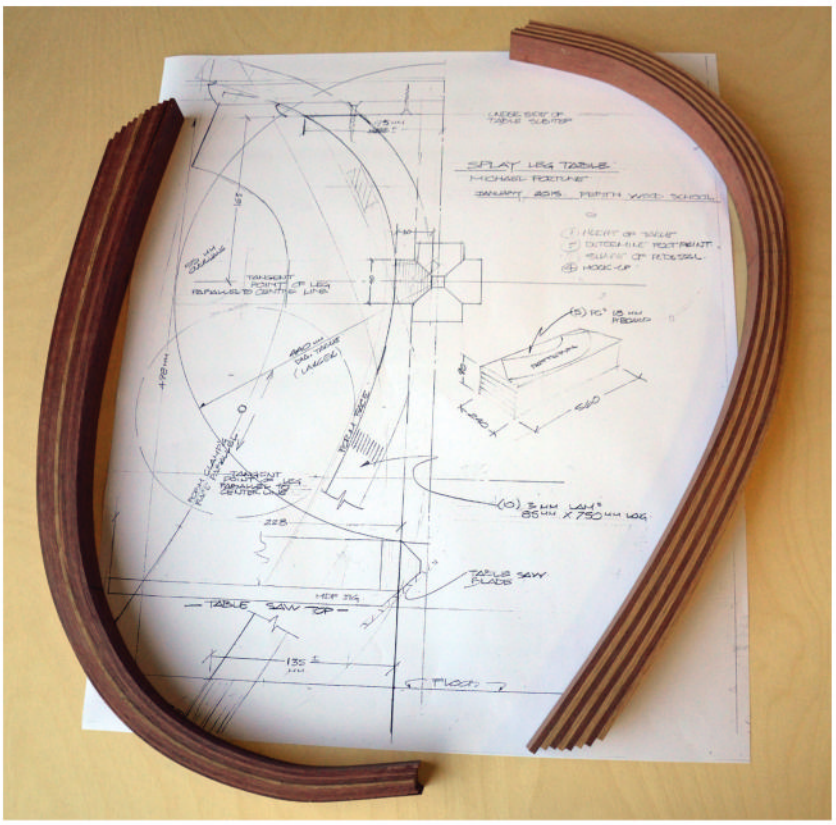
However including curves in your design may not be quite as simple as cutting out a shape from a straight board. Important factors to consider are the appearance of wood grain in relation to the curves, ease of production and the structural integrity of the curved piece.

1. Bandsawn curves

Heading for the bandsaw is certainly one of the fastest, more straightforward methods of making curves. If quick and easy is what you're after then this is the method for you. Cleaning up the rough sawn edges with rasps, spokeshaves, scrapers or even template following router bits gets the job done with a minimum of fuss.

A major advantage of sawing curved components is your ability to produce very accurate curves that are faithful to your planned dimensions and desired shape. However simply sawing a curved component from a straight wide board is not only wasteful, it also means the grain does not follow the visual flow of the curve. Don't underestimate how bad this looks. Even worse, with tighter curves running across the grain you may very well end up with a component that has particularly weak short grain running through it, destined to fail in service.

Bandsawing curves may be best suited to gentle curves and where the structural integrity of the piece won't be compromised by sections of short grain. Look for boards that have a naturally occurring curved grain as close to what you are after as possible. Make a template of the curved section and take the time to lay it across any boards you have found with curved grain. You're in luck if you can saw out a curve where the grain just happens to match!



2. Laminating curves

Often a natural progression from bandsawn curves is laminating multiple strips of wood together around a jig or former. Laminating timber to produce curves requires considerably more preparation than sawn curves but the results are well worth it.

Laminated curves require some planning and prep work to produce a jig or former that will assist in creating the shape you desire. In our workshop we utilise a vacuum bag system to press layers against a jig, but in most home workshops lots of strong clamps will usually do the job.

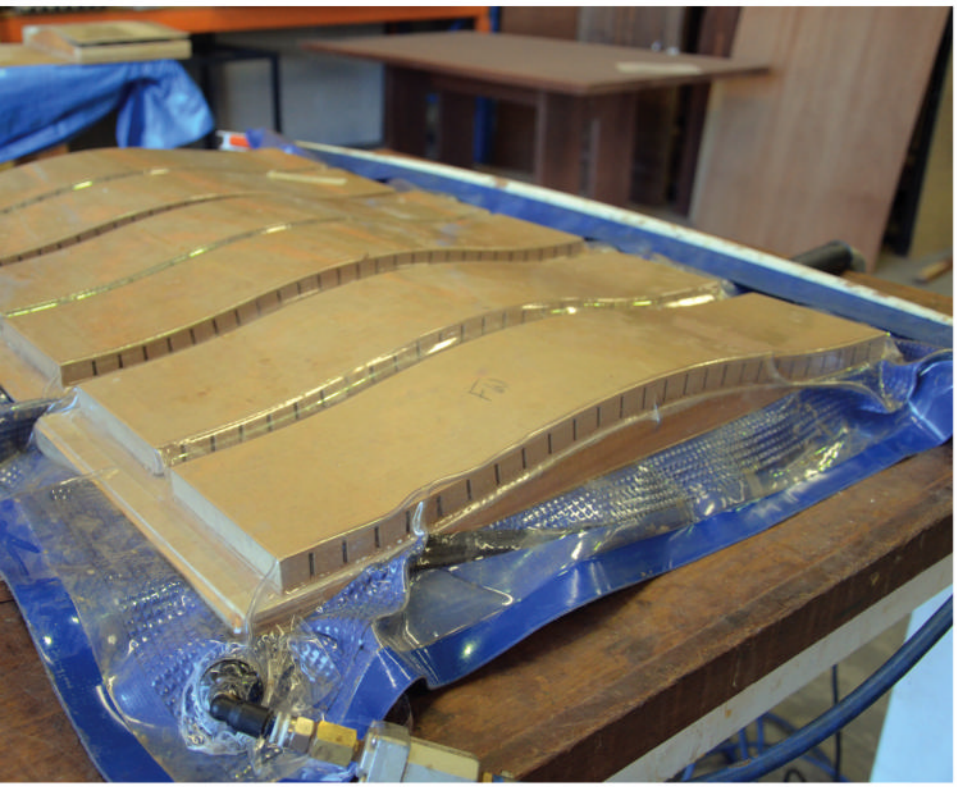
You will also need to experiment to find out the appropriate thickness of strips in the species of timber you intend to use, for the particular curve that you wish to make. It is worth noting that some timbers bend much easier than others.

Laminated curves overcome the problem of the grain not following the curve. This method often produces extremely strong components making it a good one to employ where structural integrity is important such as rockers on a rocking chair. Depending on the timber species, surface area and radius of your curve, PVA may not be at all suitable. When laminating curves we almost always opt for an epoxy adhesive.

Apart from the many clamps required, more expensive glues and preparation of jigs or formers, you do need to be aware of one significant characteristic of laminated curves. 'Spring-back' often occurs after the glue has set and once you take off all the clamps.

In laminating a curve, you have taken a bunch of strips and forced them around a curve. Once the glue has set, it locks all the timber together but the tension still remains. How much spring-back you encounter is dependent on several factors such as the timber species used, thickness of the strips, how tight your curve is, type of glue used and the total thickness of your lamination.

Spring-back doesn't just affect the results achieved straight off the jig. The tension that always exists in a laminated piece can also cause unexpected results once you start to alter the shape in any way. Removing material from the outside with a rasp or spokeshave, drilling into the sides for dowels or dominos, or chopping mortises can see your piece start to change shape. Experimention is a key ingredient for success when it comes to laminated curves.



3. Kerf-cut-bending

As a much younger woodworker I still remember watching early Triton workcentre demonstrations that involved making multiple saw cuts close together across thick lengths of timber to produce flexible pieces. Oh the possibilities! Kerf-cut bending combines the process of structurally weakening a length of timber by cutting deep, closely spaced kerfs usually across the grain, then laminating the flexible piece with outer layers to produce a rigid curve.

This method of producing curves is good fun. While it still requires just as much planning and preparation as the laminating process, the kerfed section can be easily produced on a small tablesaw or with a sliding mitre saw.

You will need to apply timber to the edges of kerf bent pieces to hide the kerfed section. You can use different materials such as a cheaper, lighter timber species for the kerfed piece, and then use your preferred timber to laminate to the outside.

4. Steam bending

Using steam to heat timber, allowing you to bend it into curved shapes is a most extraordinary technique and a really great fun exercise. Two guys that are arguably some of the most experienced practitioners in the world with this method are David Haig from New Zealand and Michael Fortune of Canada. We've been lucky enough to have both David and Michael share their wealth of experience with us over multiple visits to our workshop.

At around 99°C a strange thing happens to timber. By heating timber to this temperature, lignin, the substance largely responsible for making timber as rigid as it is, loses some of its bond strength. This allows wood to be bent into some amazingly tight curves.

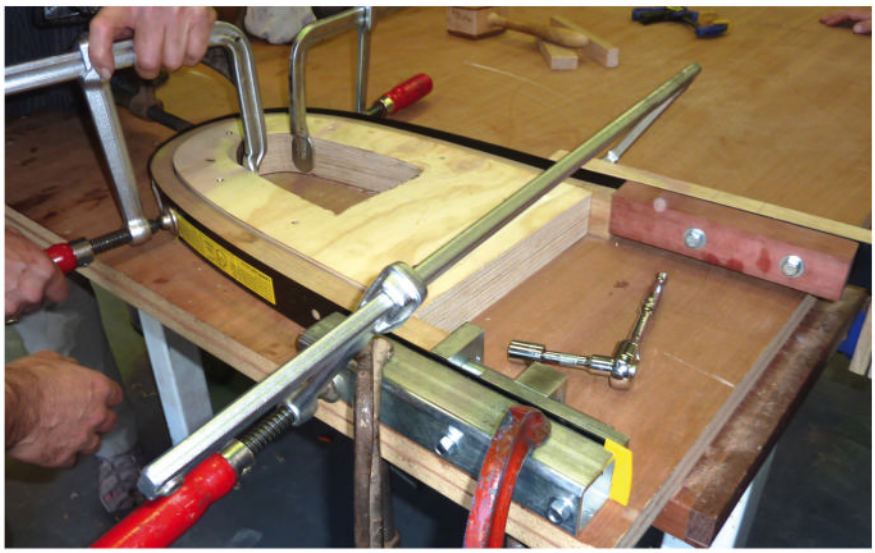
Using steam to heat timber is perfect, as it takes it to exactly the right temperature while preventing the timber from drying out at all. After reaching 99–100° and immediately upon removing timber from a steam box, the timber is flexible enough to pull around curved jigs with the aid of specially designed compression strap clamps. Michael Fortune designed almost all of the steam bending equipment sold by Lee Valley in Canada.

Much like there are suitable timbers for laminating, and those that aren't, there are species that are suitable for steam bending and those that really just fail. Air dried timber is almost essential. While some kiln dried timber in thinner sections will bend, the high failure rate makes it hardly worth attempting. Walnut, oak and beech are all great for steam bending.

There are some major advantages of steam bent components over parts produced by the other methods noted here. The grain follows whatever curve you produce, allowing for much easier shaping with a spokeshave. You have not diminished the structural integrity of the timber either.

After proper cooling and drying, a piece of steam bent wood has no memory of ever having been straight so spring-back isn't really a problem, although it can occur if the initial bend fails to be clamped and dried correctly. Continuing to curve tighter can be just as much a problem as straightening out if you don't allow the piece to dry sufficiently before removing it from its form.

The steam bending technique requires a very considerable investment in equipment. In my experience with setting up for steam bending, you would really want to be producing quite a few curved pieces or your project would want be to rather high-end for it to be worthwhile



5. Hot pipe bending

If you are bending rather thin pieces of timber, another fun way to create tight curves is by setting up a hot pipe and pulling your timber around it. This technique is low cost, easy to set up and opens up some interesting possibilities and projects. As the name suggests, a small length of metal pipe, heated with a gentle flame provides the heat source to break the lignin bond as described for steam bending.

I've also seen people rig up an old saucepan and propane torch.

Around 150mm of reasonably thick walled steel pipe of between 35 and 60mm diameter is ideal. Two or three metal tabs welded onto one end allow you to fasten the pipe to a hardwood backing board.

A cheap propane torch available at most hardware stores is a good heat source. Once hot, you only need a tiny flame to maintain the correct temperature. When droplets of water dripped onto the pipe dance around briefly before sizzling off, you've got it about right. Too hot and the droplets sizzle off immediately.

With the absence of steam to prevent your timber rapidly drying out and resembling burnt toast, you need to soak your pieces in water for a couple of days. Walnut dressed down to 4–5mm works brilliantly with this method. I haven't had so much success with beech, however the beech I have is definitely kiln dried.

Some duck bill sheet metal locking pliers are perfect to hold the ends of your timber and aid your ability to pull it down and around the hot pipe.

After creating your curved components with one of the methods described here, you may like to shape the timber to create some smooth, graceful lines. Rasps, files and abrasives are all very handy for this task but my favourite method of working curves is definitely the spokeshave.

When I was very young, my great grandmother told me stories of her father taking her along to the wheelwright to replace the steel tyre on his cart wheel. She would describe watching one of the wheelwrights shaping spokes with a spokeshave. Of course at the time I had no idea what a spokeshave was. Shaping curved pieces of timber with one of my spokeshaves is the very most enjoyable activity that I can do in this amazing world of woodworking.

Photos: David Howlett

Left: Curved trunks are an indicator of reaction wood.

Opposite:
Eccentric and darker zones in the larger cross-cut section show compression wood. Markings on the smaller cross-section are not as apparent – wetting such surfaces can reveal them more distinctly.

Opposite inset:
Endgrain from a severely bowed door stile shows compression wood.

Below right:
Showing collapse in severe tension wood as well as cracks from high drying stresses across and along the grain. The resulting collapse doees not respond to reconditioning as would normal wood.

Reaction Wood

Some growing trees can produce wood that is hard to machine and subject to shrinkage, explains Jugo Ilic.

Trees grow upward towards light. If a tree is subjected to natural forces, such as prevailing winds, loading from snow, ice, rocks or soil, or if it grows on a slope, it will still grow in such as a way as to bring its stem back to a vertical position. Reaction wood is the term used to describe the abnormal woody tissue which can develop in response.

Reaction wood develops in different parts of the tree in softwoods and hardwoods. It differs physically, microscopically and chemically, but also exhibits similar properties which affect the processing of wood and products in service.

In softwoods, reaction wood is called compression wood (CW) and is laid down on the underside (compression side) of the bend. In hardwoods, reaction wood is formed on the upper side of the leaning, bent stem or branch and is called tension wood (TW), so-called for its assumed state.

Signs of compression wood

Crookedness or sweep in a log and distorted boards are signs of reaction wood. Examination of the end of a bent stem usually shows eccentricity around the pith in which the wider part of the stem contains the reaction wood, often with wider or darker coloured portions of growth rings.

Severe compression and tension woods show zones of increased density and hardness, usually appearing darker. However, tension wood is often difficult to detect and sometimes appears silvery and other times dull and lifeless. On log-ends, billets and endgrain, severe reaction zones can be seen with the naked eye but as the severity diminishes, they can be difficult to detect macroscopically.

Effects on end-use and processing

Properties of most concern from both CW and TW include abnormally high longitudinal shrinkage (along the length of a board) which can be up to 20 times higher than in normal wood from green to oven dry. Considering TW, transverse shrinkage (across the grain) is higher than normal wood and the tissue is prone to irrecoverable collapse because of reduced lignin content.

On the other hand shrinkage across the grain from CW zones tends to be lower than that from the normal wood because of the higher lignin content

within the cell wall; the fibres are up to 30% shorter in length and have significantly less steep microfibril orientation which results in lower stiffness in spite of increased density.

In dry and drying wood

Distortions of components with reaction wood can arise during drying but can continue in dry components. Changes tend to occur from the slow release of built-in stresses. Presence of CW causes distortion and splits in veneer and plywood, as well as warp in framing timber and other components.

When machining

Reaction wood can pinch against a sawblade or splay widely apart when cutting. When carving, compression wood may reveal itself as abnormally hard or brittle. When stained it may not take uniform colour and be more prone to splitting when nailed into.

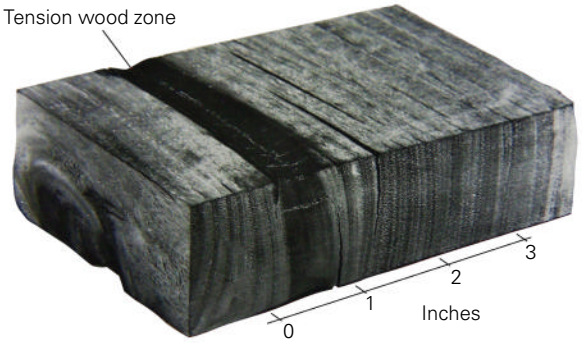
Both TW and CW have lower compression and impact strength relative to their density compared with normal wood.

Reaction wood fibres of TW contain a less than expected amount of lignin and more cellulose. Apart from wood distortions, TW is commonly stronger than normal wood but machines poorly, as fibres do not sever cleanly leaving a fuzzy or woolly surface.

Aside from difficulties in sawing TW, seemingly successful efforts to smooth the wood are inclined to leave microscopic woolliness on a surface which tends to absorb stain or finishes irregularly leaving the surface blotchy.

As the amount of reaction wood reduces it becomes increasingly more difficult to detect however it can still lead to problems. The pine internal door stile whose endgrain is shown above buckled after six months, so much so it was difficult for the door to latch. Examination of the stile's endgrain showed that a band of CW was responsible.

When selecting wood it pays to look out for signs of reaction wood as machining and shrinkage problems can occur.



Dr Jugo Ilic worked as a wood scientist at CSIRO for 36 years. As part of his research activities he authored the CSIRO Atlas of Hardwoods and curated the Australian Wood Collection which will soon be available as an online reference.

Joinery With Handplanes

There is much to be accomplished and enjoyed with traditional handplanes. Troy McDonald writes about their types and capabilities.

In *AWR#88* we took a close look at moulding planes and the creative opportunities they present to both the traditional and modern woodworker. In this article we'll introduce a number of the more specialised joinery planes available to assist with the fitting of joints.

Just like their moulding plane cousins, these joinery planes should not be seen as the bastion of traditional woodworkers. They will be found to have application when used for the final fitting of machine cut joints or alternatively for the cutting of one-off joints where machine set-up time might exceed the time taken to cut the joint by hand.

The planes discussed here include the shoulder plane, skew rebate plane, router plane, side rebate plane, plough plane and the dado plane. I have listed the planes in what I believe represents the relative value of each plane to the modern woodworker.

By modern woodworker I mean someone looking to use traditional tools in a hybrid fashion alongside a basic array of electric hand tools and machinery. Of course, were you to restrict your woodworking to the use of traditional methods only, then the relative value of these planes would be very different to the order presented here.

As noted with moulding planes, the majority of these joinery planes are available as both original vintage planes and also as modern interpretations of classic tools. In many cases the modern versions of these planes now outperform their ancestors due to developments in design, manufacturing methods and materials technology.

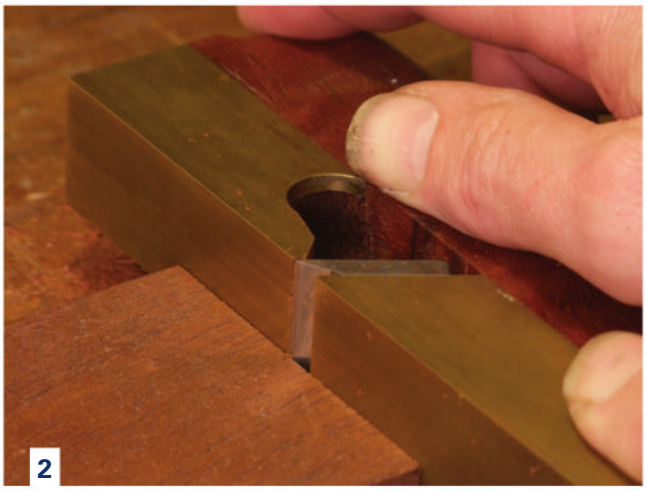
Shoulder planes

Like one or two standard bench planes, it would be hard to imagine the toolkit of even the most ardent machine woodworker not including the shoulder plane. This is a plane of some finesse, being designed for light cuts and exacting use. In their vintage form, shoulder planes were occasionally made of exotic materials such as gunmetal, ebony and rosewood (**photo 1**).

Shoulder planes are unique in that their sides are manufactured to be perfectly square to the sole. Made of either metal or wood, they were available with either straight or skewed blades with the skewed version being preferred for applications across the grain.

The shoulder plane has the blade set at a low angle, typically 15°, with the bevel facing up. The squareness of the stock allows the plane to be used accurately on their side for trimming the shoulder of a tenon as shown in **photo 2**, or alternatively, with the sole horizontal to trim a rebate or tenon face.

In use, the shoulder plane will not work effectively unless the blade is set just proud of each side of the plane (**photo 3**). Set for a light cut, this plane is a delight to use either with or across the grain and will be found to be indispensible for the final sizing of tenons and the trimming of rebates.



1. A mix of vintage and modern shoulder planes.
2. Shoulder plane in use trimming the shoulder of a tenon.
3. Shoulder plane set for a fine cut with the blade just proud of both sides of the plane.

4. Shoulder planes are indispensable for smoothing fillets in moulded profiles.
5. Skew rebate planes, vintage and modern.
6. The business end of a skew rebate. Note the depth stop, fence and skewed blade and knicker.
7. Cutting a rebate with the skew rebate plane (left hand removed for clarity).

It is also an essential companion plane to go with your moulding planes to sharpen up fillets within moulded profiles (**photo 4**).

Skew rebate planes

The skewed blade of the skew rebate plane or fillister plane ensures it is just as effective at cutting rebates both with and across the grain. Whilst the plane may not have the refinement of the shoulder plane it is designed for heavier work and includes additional hardware including a fence, depth stop and cutting knives or knickers located ahead of the main blade (**photos 5, 6**).

The knickers are crucial to successful cross grain work as they allow the grain to be severed ahead of the blade, thus avoiding torn grain along the edge of the rebate. Like the shoulder plane, the skew rebate should be tuned carefully to ensure the blade sits slightly proud of the square side of the plane. Some modern versions of this plane include adjustable stops that allow the blade to be removed and reinstated in perfect alignment.

The plane is cleverly designed such that the skewed blade and mouth combine to ensure shavings are thrown to the left of the cutter to keep them clear of the rebate being worked. The skew blade is also helpful in ensuring the blade is drawn in to the edge of the rebate being cut reducing the likelihood of the tool drifting offline.

Whilst the skewed blade is one of the secret ingredients to the success of this plane it can make blade sharpening more difficult when compared with straight bladed planes. When sharpening or honing, the use of a guide to preserve the accuracy of the angle of skew is highly recommended. With fence and depth stop set, the skew rebate plane is very efficient at cutting rebates or raised panels and a multitude of other tasks as shown in **photo 7**.

Router planes

For many years the router plane was destined for extinction following the invention of its electric namesake. In recent years however, it has made something of a comeback as woodworkers rediscover the usefulness and versatility of this tool. It is perhaps unique amongst handplanes in that the blade can be set to cut at a level which is referenced off the sole of the plane. In this way, the tool can plane a surface parallel to the one on which the sole of the plane rides.

This is not a tool for the preliminary or initial cutting of joints, use the electric version for that. Where this plane shines is in the final fitting of a joint just like the shoulder plane noted earlier. The plane is highly efficient at tweaking the depth of a housing, or accurately cutting a hinge mortise to a predetermined depth (**photo 8**).

The base of the router is designed to span the trench or housing being cut providing a level surface from which to reference. The tool is made in a number of sizes as shown in **photo 9**. Early router planes made of wood were often user made and very simple in construction. Later cast versions typically included vertical blade adjustment mechanisms to improve their ease of use. I stick to the standard blade, however various shaped cutters are available, making it possible to rout depressions of differing shape.

Perhaps the one additional advantage the router plane has over its electric descendent is the fact that it can be used to rout a trench or housing into a blind corner or tight space not possible to reach with the large base of an electric router.

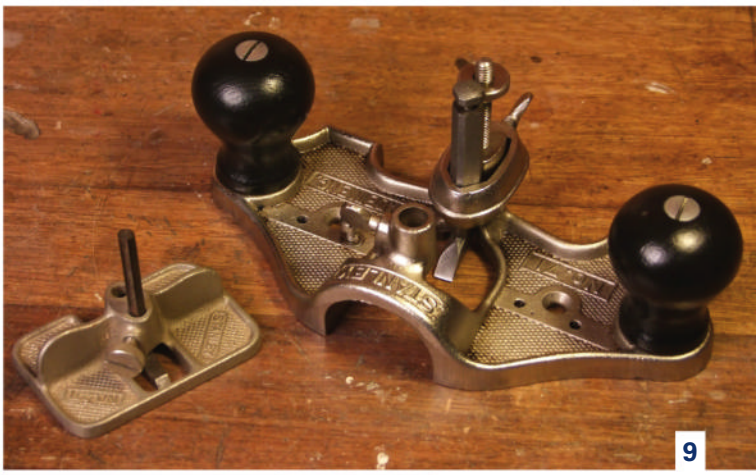
Sharpening the blade of a router plane can be a little challenging given the vertical stem attached to the blade. Try grinding the blade freehand on the curved end of your linisher or belt sander, both of which provide free space for the stem to extend into. Finally, hone the blade on your preferred stone. Turning the stone on its edge is a simple way to give yourself the additional height required to ensure the stem doesn't interrupt honing (**photo 10**).

Side rebate planes

Quite specialised in application, the side rebate plane is designed to cut the side of a housing or ploughed groove to increase its width. To perform this task, these planes are designed with their blade in the vertical plane, that is, the sole of the plane is actually on the side as opposed to the bottom of the plane.

A number of examples of side rebate planes are shown in **photo 11**, including a vintage pair with their equivalent modern plane. Small cast steel side rebate planes are also available, however the additional length of the wooden side rebate provides a significant advantage in use. The wooden version also typically has a wider iron affording it the ability to trim a groove of greater depth.


8


9


10


11

8. Deepening a housing with a router plane.

9. Router planes are available in a range of sizes and with multiple cutters.

10. Honing the router plane blade on the edge of your stone gives clearance for the cutter stem.

11. Vintage left and right hand side rebate planes and modern version.

12. Side rebate plane in use.

13. Quality plough plane in solid rosewood and its modern equivalent.

14. Plough plane in use cutting the groove to take a panel.

15. Dado plane in use cutting a cross grain housing.

16. Knicker of the dado plane and the resulting scoring cut it produces.

12

13

14

They are made in left and right hand versions to allow them to be worked with the grain at all times. Vintage planes can be notoriously difficult to tune but once set for a fine cut they excel at the specialised task they are designed to perform (**photo 12**).

This is not a tool you will reach for often, however, the widening of a groove or housing is such a difficult task to perform accurately with hand tools that the side rebate plane can be a source of great relief when the need arises. Paring chisel aside, there is no other hand tool that can be used with any accuracy to perform this operation.

Plough planes

I have chosen the original English spelling within this article, however, in most circles today the English terminology has given way to the American plow in response to the dominance of the American market.

Deemed 'the prince of planes', the plough plane was more often than any other tool the one to be chosen for embellishment with rare and expensive materials. The plough plane was an indication of the material wealth or status of its owner with ebony, boxwood, rosewood and ivory amongst a long list of precious materials occasionally used in its construction.

In simple terms the plough plane is used to cut a groove along the grain either within the edge or face of the work. Plough panes typically include a selection of interchangeable blades to control the width of the groove to be cut, a depth stop to control the depth of the groove and an adjustable fence to accurately position the groove upon the work. On vintage planes, the mechanisms employed for positioning the fence and the design of the handle are perhaps the most notable indication of quality, aside from the materials of construction.

The most basic ploughs were devoid of handles and incorporated sliding arms positioned by simple wooden wedges whilst the more expensive planes incorporated fully shaped, closed handles and elaborate threaded arms with wooden nuts (**photo 13** left). Modern metal plough planes have additional features such as adjustments for advancing the cutting blade (**photo 13** right).

In a true illustration of effective design, the mouth of the plough plane is shaped to throw shavings off to the right, so keeping them clear of both the ploughed groove and its positioning fence on the left of the plane.

There is much that could be written about the wonderful design principles of the plough plane, such as the ornate moulding on the fence to reduce its bulk and mass, but more importantly let's simply say the tool is a joy to use

and something every woodworker with an appreciation of hand tools should experience.

In use, like the moulding plane, the plough is best started at the far end of the work. This allows the cutter to be guided by the groove cut during the previous pass. Keep the fence pressed tightly into the work and ensure the body is kept upright, with each stroke moving further back until a shallow groove has been cut along the intended length.

With this shallow groove achieved, full passes can be taken in the more traditional way, with the cut beginning at the near end of the board. **Photo 14** shows the plough in use cutting a groove in the edge of a frame to accept a panel. Learning to use this tool is to experience one of the simple pleasures of working wood.

Dado planes

To the untrained eye, a vintage dado plane bears a striking resemblance to the much more common moulding plane. The term dado, simply refers to a groove cut across the grain within a panel or gable. Perhaps the most obvious application being for housings cut across the solid timber gables of a bookcase to accept the shelves.

As discussed previously, cross grain cutting is invariably improved with a skewed blade and this is a notable design feature of the dado plane. The second requirement to successful cross grain cutting is to ensure the wood fibres are scored or cut ahead of the blade.

A look at **photo 15** shows the additional vertical wedge at the front of the plane and it is this wedge that holds in place the knicker iron that performs this important task. In tuning this plane it is crucial that the knicker and blade are matched in width. To retain this match, it is very important to only ever sharpen the inside edges of the knicker iron leaving the outside width preserved. Like the skew rebate plane, the iron of the dado plane needs to be sharpened at a set angle which is important to preserve for the life of the plane.

A dado plane has no fence to guide its cut, hence a simple guide is typically clamped or nailed to the workpiece adjacent to the desired location of the dado. The depth stop on the plane is set for the desired dado depth and with both knicker and blade set for an appropriate depth of cut, the plane is run along the edge of the batten.

To ensure the knicker effectively cuts the cross grain fibres it is sometimes good practice to pull the plane backwards before the first planing pass to provide assurance the wood fibres on each side of the dado have been severed (**photo 16**). As is the case for all the planes discussed here, the dado plane is a beautiful plane to use in performing the specific task for which it has been designed.


15


16

The journey not the destination

I should again reiterate that it is not my intention here to suggest that any of these planes can sensibly be considered for production work. In my workshop, that is the domain of modern machines. In woodworking however, as much pleasure should be derived from the journey taken to complete a project as the project itself and hence the opportunity that exists in further developing your hand tool skills. Not surprisingly, all of these tools offer a closeness to working with the material at hand and a degree of pleasure in their use that no machine can ever match. What may surprise you though is just how efficient these tools are in completing the tasks for which they have been designed. With one or two of these planes in your kit, properly tuned and ready for use, you will find their ability to fine tune joints or cut one off rebates and dados to be both efficient and pleasurable.

Photos: Troy McDonald

Troy McDonald is an engineer and woodworker based in Brisbane.
Email him at: helenoftroy1@optusnet.com.au

Sheet metal product manufacture for Triton takes place in Melbourne at Diver Consolidated Industries in Reservoir, Vic. *Photo: Mark Fawthorpe.*

40 Years of Innovation

Product and marketing initiatives are responsible for the ongoing success of the Triton brand.

Founded by George Lewin in 1975, Triton is one of those brands that are etched into the Australian psyche as very much a native species, despite the fact that its ownership went offshore.

Triton Manufacturing and Design Co, as it was originally called, unleashed a revolution for individual makers, in particular part-time and hobbyist woodworkers. With their versatile workcentre, Triton offered a one-stop sawing, clamping device that would become the creative heart of over 400,000 sheds locally and the world over and launched many on their woodworking journey.

With its distinctive orange livery the Triton range came to include other workstations and accessories, and later on a range of power tools and benchtop machines. In particular the Triton router (TRA001) released in 2001 sparked another revolution with its power and above tabletop bit changing capability.

A big part of Triton's success, according to Gordon Heggie, Triton employee for over 30 years and a former sales manager, demonstrator and trainer, was that 'Triton was perfect for its time because it landed in an Australian market where DIY was on the rise, more so than in any other country. Australians were unique in that they tended to buy bigger power tools that they were often then afraid to use. Triton "tied" those powerful tools down to a work or router bench and offered them safe precision machining.'

Triton's founder George Lewin not only became known for his innovative designs, but for encouraging innovation from other designers. How did it all get started? An explanation recently emerged on Stuart Lees's popular online blog*, penned by George himself. 'It had been nurtured from an idea that took root in my head one fine day when I was a 25 year-old TV journalist for ABC-TV News, struggling to build a dining table. With incredible twists and turns and with the help of some wonderful people, that idea grew into a multi-award winning business that ended up employing hundreds of people, and which sold about $300 million worth of products around the world over the ensuing 25 years.'

In the same post George goes on to explain how his decision to sell Triton in the mid-90s was a personal one where he wanted to reaffirm his own identity and address his 'chronic workaholism'. Triton's success as an innovator had brought it onto the radar of large manufacturers such as Black & Decker who sought to add to their topline Elu range and market the workcentre throughout Europe.

An offer came from UK-based Global Machinery Corporation (GMC) but was refused. Eventually In 1999, George sold the company to an Australian company, Adelaide based Hills Industries. Under Hills, Triton's profitability and market share went down and ironically it was then sold offshore to GMC. After GMC went into receivership Triton was bought out in 2009 by UK-based Powerbox. After that things were back on the up, flash forwarding to April, 2014 where distribution rights were given over to White International who have rebuilt the brand and expanded distribution.

George Lewin went on to develop the Triton Foundation, a not-for-profit which sought to encourage and mentor inventors. Interestingly, the Triton Foundation was instrumental in bringing *The New Inventors* onto ABC TV, a show whose forerunner, *The Inventors*, gave him his first break.

From the start, innovative marketing drove sales of innovative products. Triton installed video players and TVs in 250 stores around Australia screening product presentations mostly by George Lewin himself. Triton instigated live in-store events with a team of 55 demonstrators who were sought-after by other companies for their sales skills, because, as Gordon Heggie said, 'we used to say we hopped over the counter and dealt directly with the people who were buying'.

'Where other companies allocated around 5% of their budget to marketing, Triton spent 14–15%', Gordon said. Once a year, in October, *The Triton Times*, a full colour tabloid size broadsheet, was mailed out to a list of 60,000. New products, projects, profiles, discount tickets to wood shows and other info made for a well-read publication.

Knowing they would sell off the back of this mail-out, Triton reps would approach retailers in August and September and convince them they needed to get their orders in! With low margins, reps were also furnished with statistics harvested from buyer warranty card surveys that showed retailers why selling Triton goods would generate a further $3000 sales of related products within 12 months and potentially much more in the long term.

With its face to face marketing and retailing initiatives, Triton created a culture of ownership which led to the establishment of Triton Owners Clubs. At one stage there were around 25 clubs with an average of 40–50 members. 'The Triton Owners Clubs had the effect of lifting people up to a higher level of woodworking', said Gordon.

Triton's success has relied on the innovative nature of both its products and its ability to educate and create a culture of users. Although now owned by a UK company Triton's distributors are Australian based and production of sheet metal products such as sawbenches and router benches takes place in Melbourne, while anything with a plug or a battery is made in either China or Taiwan.

For today's new generation of makers, the Triton brand is still a popular workshop and jobsite choice.

Triton products are distributed in Australia by White International, see www.whiteint.com.au and www.tritontools.com or phone 1300 780-876 for more information.

** Read more of George Lewin's story at www.stusshed.com*

Samples of the Triton Times. Each issue featured new products, projects and other information.

Wood Diary

For more events and news sign up to AWR fortnightly newsletters at:
www.woodreview.com.au

Diary listings are free. **Mail to:** Wood Diary, PO Box 3893, Loganholme DC, Qld 4129 **Email to:** linda@woodreview.com.au
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 6 DECEMBER
Trees+ – Sculpture by Terry Martin
Bungendore Wood Works Gallery
Kings Hwy, Bungendore, NSW
www.bungendorewoodworks.com.au

Until FEBRUARY 7, 2016
Rigg Design Prize exhibition
National Gallery of Victoria
www.ngv.vic.gov.au

21 NOVEMBER–5 DECEMBER
Transformations: Graduate Exhibition
Sturt School for Wood, Mittagong, NSW
www.sturt.nsw.edu.au

21–22 NOVEMBER
Eltham & District Woodworkers
28th Annual Exhibition & Demonstrations
Eltham Community Centre Main Rd, Eltham
Geoff: 03 9432 9047 Barry: 03 9439 7901

21–22 NOVEMBER
Churchill Scrollsaw Weekend
Churchill Community Hall, Vic
Bob Calhoun: 03 5135 3675

28–29 NOVEMBER
Woodturners Society of Queensland Inc
Woodturning Exhibition and Sales
Mt Coot-tha Botanic Gardens, Auditorium,
Toowong, Qld
Brian Creese: brian.creese@bigpond.com

28–29 NOVEMBER
Barwon Valley Woodwrights
Annual woodcraft exhibition
Masonic Centre, Regent&Church Sts,
Belmont Vic
Laury Vella: lauryvella@bigpond.com

6 DECEMBER
Tool Swap/Social Day
The Traditional Tools Group
Brush Farm House, 19 Lawson St,
Eastwood NSW
www.ttg.org.au

15 DECEMBER
AWR Student Awards – Entry deadline
www.woodreview.com.au/student-awards

2016
2–3 JANUARY
Bellarine Woodworkers
Exhibition & Sales
St James Church Hall, Portarlington Rd, Drysdale, Vic
Charlie Christiaans: 03 5251 3484
Email: christiaanscrafts@bigpond.com

5 FEBRUARY
Wootha Prize entry deadline
www.malenywoodexpo.com/wootha-prize/

13–14 FEBRUARY
Tools & Techniques Weekend
Sturt School For Wood
Mittagong, NSW
www.sturt.nsw.edu.au

14 FEBRUARY
Exhibition of Work by Warwick Powis
Sturt School For Wood
Mittagong, NSW
www.sturt.nsw.edu.au

28 FEBRUARY
The Traditional Tools Group
2016 Sydney Tool Sale
The Brick Pit Sports Stadium
1A Dartford Rd, Thornleigh, NSW
Email: clyntsheehy@tttg.org.au
www.ttt.org.au

12–13 MARCH
Woodturning and Woodworking
Craft Show
Woodturners of the Goulburn Valley
Eastbank Centre, Welsford St, Shepparton, Vic
Len Taylor: 03 5823 2430, 0458 777 901
www.woodturnersgv.com

12–13 MARCH
Lost Trades Fair
Kyneton Racecourse, Vic
www.rundellandrundell.com.au

Collaboration One

Three makers combine to create a piece whose form and contents represents the pinnacle of their work. Story by Linda Nathan.

The cabinet and its lustrous hand tool contents known as *Collaboration One* was one of those things that toolmakers Terry Gordon and Colen Clenton had wanted to do for some time. 'We're really taking it to the top of the tree', said Phoebe Everill, maker of the cabinet and the third collaborator. 'We're saying this is what we're really proud of, it's the complete package'.

Around 12 months prior to its unveiling at Sturt Gallery in Mittagong, the three makers decided to make it happen. 'I'm not sure if this kind of collaboration has ever been done before in Australia', said Phoebe, 'but both Terry and Colen wanted to make complete high-end sets of their tools from premium timber, and house them in a specially made purpose-built cabinet.

For Terry the collection is a commemoration of his 20 years making hand tools and also the success of the independent but close working relationship that he and Colen Clenton have enjoyed. The first of the newest addition to the HNT Gordon range is also included. The moving fillister is his 50th line of planes and was developed in conjunction with son Nelson whose work formed part of his final competency assessment for his fitter/machinist apprenticeship.

The wood used for the tools made by Terry and Colen is not Macassar ebony (*Diospyros celebica*), but another from the family Ebenaceae. Consecutive boards of black ebony or *Diospyros ferrea*, all from the same tree, were sourced from Theo Catsoulis of Agora Trading in Queensland. Any variance in figure or striping on the tools is due to whether the sections used are quartersawn or backsawn.

Making the two sets of tools from the same matched boards highlights the collectability of these sets. 'All the the tools have the grain running end-to-end through them', Colen said, 'and the front of the gauges are bookmatched to the squares'. Colen's set also includes a 2" 45° marker, and a shorter scratch awl; both new additions to his range. In a nod to another maker who Terry and Colen have worked with, a mallet by Micheal O'Connor is included.

'The cabinet design is inspired by Krenov's work and is also a much more elaborate development of Phoebe's own tool cabinet which has become a trademark of her business as a maker and woodwork teacher. 'Making the cabinet was a huge challenge but I'm really happy with the design', Phoebe said. 'There was a lot of mocking up to get it to look balanced on its base.'

The cabinet is made from Tasmanian sassafras, with blackheart sassafras veneer

used on the doors. The veneer was supplied by Rob Keogh of Britton Timbers, Tasmania and chosen because its stripey tones would provide a visual foil for the ebony tools. The veneer was also selected for its unique figure and the arrow head markings that reflect it's purpose as a tool cabinet. Other detailing on the cabinet is in wenge and ebony.

As well as visual balance, a major concern was the weight of the loaded cabinet. 'Physically it was tricky stuff to allow for around 80kg tools and still be able to swing the doors and not have it not fall forward', Phoebe said. This was also a collaborative process. 'Sets of Colen and Terry's tools have been back and forth', laughed Phoebe. 'We also decided to ramp all Terry's tools back at a 7.5° angle (matching the plane bodies) to get the centre of gravity right.'

The top and base separate by means of a specially made ebony allen key and handle. A brass plate with the makers' names, the year of making and title of the piece is fixed to the top of the cabinet base. The drawers contain a provenance statement in the form of a 'book' made by Terry from ebony veneer along with a pen also turned from ebony.

Seeing it all come together was the realisation of a dream for the makers. *Collaboration* One can be seen at Sturt Gallery until March 2016 when it travels for viewing to the Lost Trades Fair in Kyneton, Victoria.

Above: The makers (left to right) Terry Gordon, Phoebe Everill and Colen Clenton.

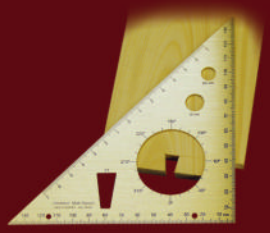
The makers are adamant that the cabinet and its contents will not be separated. *Collaboration One* is for sale at $59,400.

Photos: Terry Muller

For more information about Collaboration One email Terry Gordon at planemaker@hntgordon.com.au or Phoebe Everill at phoebe@phoebeeverill.com, or phone Colen Clenton on 0408 338 582.

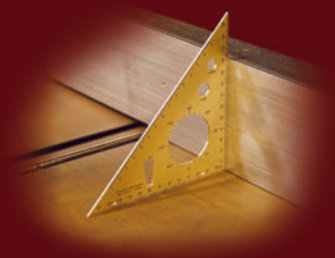
RULE, SET, MARK & SQUARE WITH THE

MULTI SQUARE



MARK OUT DOVETAILS

CHECK YOUR JOINTS ARE SQUARE



SET PLANER FENCES AT 90°

USE FOR GENERAL RULING

SET DEPTH OF ROUTER CUTTERS

USE THE PROTRACTOR TO SET BEVELS

USE AS A CENTRE RULER

SET DROP SAWS TO 45° AND 90°

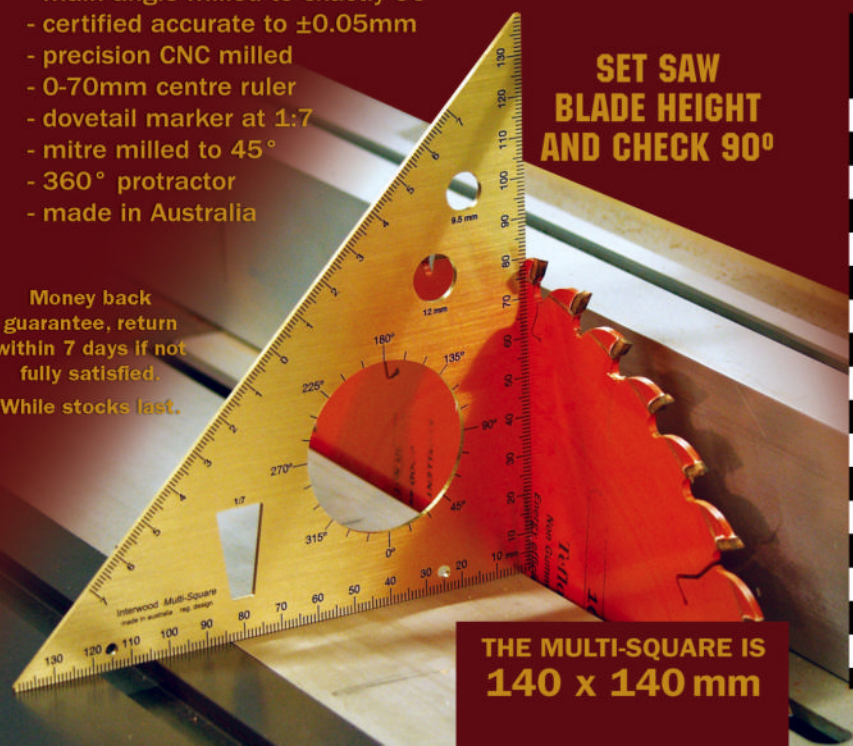
ALIGN DRILL BITS

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

USE AS A TRADITIONAL SQUARE BY SCREWING ON A 10 X 10MM WOOD FENCE USING THE PRE-DRILLED HOLES.

SET SAW BLADE HEIGHT AND CHECK 90°



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Digitally Remastered

In the sixth decade of his career, Wendell Castle's work is still new age.

Twenty years ago, a story in this magazine* wrote about the significance of USA artist Wendell Castle's work. It referred to his 30 year plus career which paralleled America's studio craft movement but also diverged from it as he sought to make sculptural art furniture rather than the functional kind.

Back then we interviewed Wendell Castle by telephone and amongst other things asked him what motivated him in his artistic explorations. His answer then was: 'One of my favourite sayings is, if you hit the bullseye every time, the target is too near. I have never wholly accomplished the goals that I have set for myself… the closer I get, the farther away I am'.

Now, at the age of 82, in the sixth decade of his career, it's apparent he is still kicking the target ahead. Known as the innovator of stack lamination, that is, gluing up thick boards into a mass that is then sculpted, Castle has redefined that technique by combining digital technologies with handwork.

In the 60s and 70s chainsaws, power planers and grinders followed by chisels, gouges and scrapers were the tools used to realise his curvaceous designs. In these times the hand tools are still used, but as the final stage after 3D scanning, 3D modeling and in-house CNC milling with a robotic machine named 'Mr Chips' has taken place.

Clockwise from opposite page: The robotic CNC machine known as Mr Chips now carries out the initial shaping of Wendell Castle's sculptural furniture designs. Photo: Matt Wittmeyer.

Wendell Castle in his studio. Photo: Matt Wittmeyer.

Wendell Castle, *More or Less*, 2014, stained ash, 737 x 1384 x 1902mm. Photo: Adam Reich.

Wendell Castle, *Double Chair*, 1967, oak, 838 x 1368 x 711mm. Photo: Matt Wittmeyer.

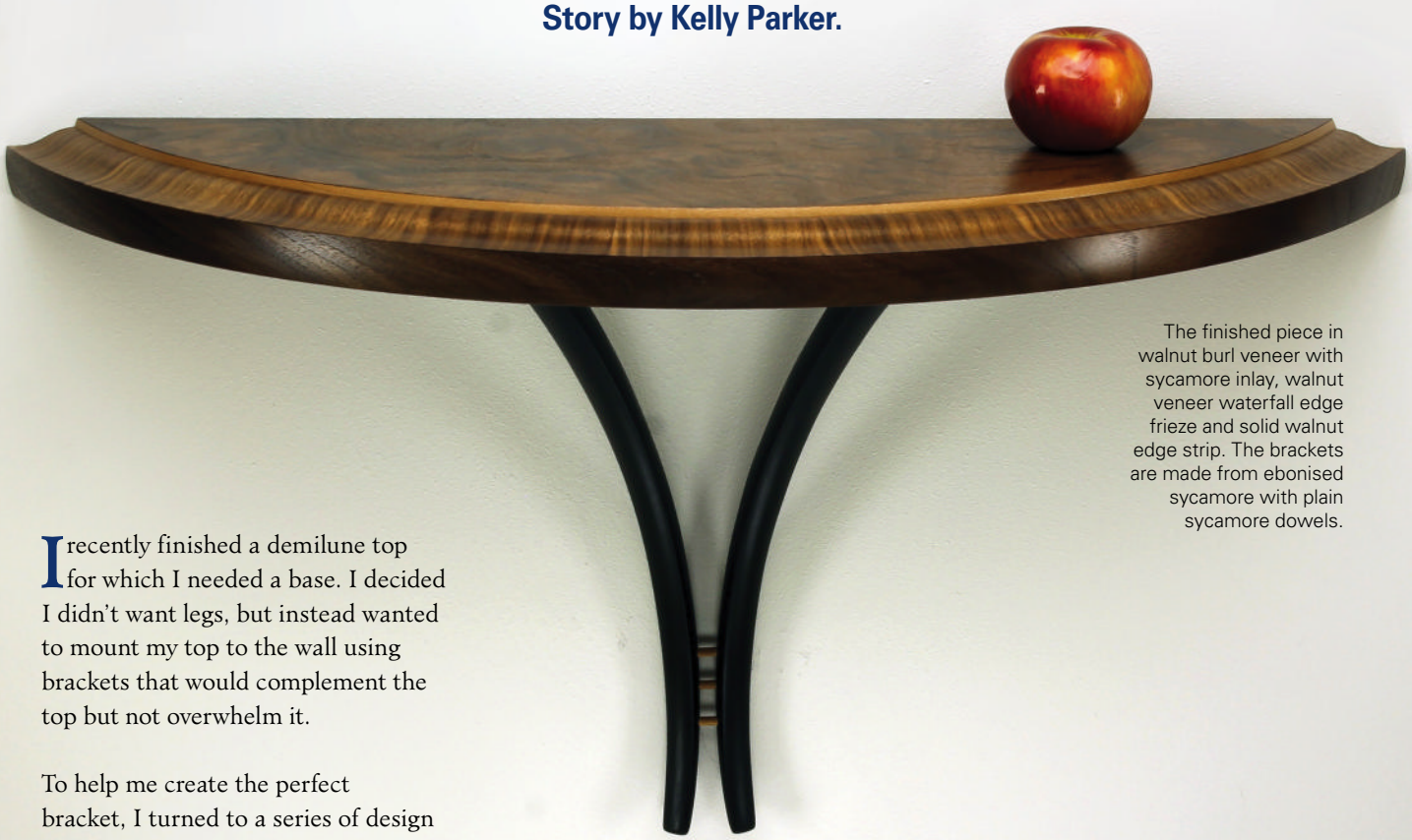
Wendell Castle Remastered is an exhibition which runs at the Museum of Arts and Design in New York until February 28, 2016. It presents early and recent works and in conjunction with gallery text, photographs and film, charts the changes in how this artist conceives and produces his work.

Images courstesy Museum of Arts and Design, New York. See www.madmuseum.org for more information.

** Wendell Castle: Furniture that Functions As Art appeared in AWR#8, 1995.*

Making Ideas

Design techniques that will fire your creativity.
Story by Kelly Parker.



The finished piece in walnut burl veneer with sycamore inlay, walnut veneer waterfall edge frieze and solid walnut edge strip. The brackets are made from ebonised sycamore with plain sycamore dowels.

I recently finished a demilune top for which I needed a base. I decided I didn't want legs, but instead wanted to mount my top to the wall using brackets that would complement the top but not overwhelm it.

To help me create the perfect bracket, I turned to a series of design techniques that are guaranteed to give me results. My process involves sketching, modelling, mocking up and prototyping. Although this may sound like a lot of steps and a big time commitment for a one-off object it is a sure-fire way to generate numerous ideas in a short period of time.

Sketching. The top has walnut burl veneer, sycamore inlay, radial walnut veneer on its waterfall edge and is bordered in solid walnut. It has a lot going on and I didn't want the bracket to be a distraction. As I sketched, I explored variations. If I drew a design with three elements, what did it look like with one or five elements? If the elements were narrow on the ends but wide in the centre, what if those proportions were reversed? If planar elements were linear? If they came together at the top? Or the bottom? In this manner I quickly came up with almost 30 sketches.

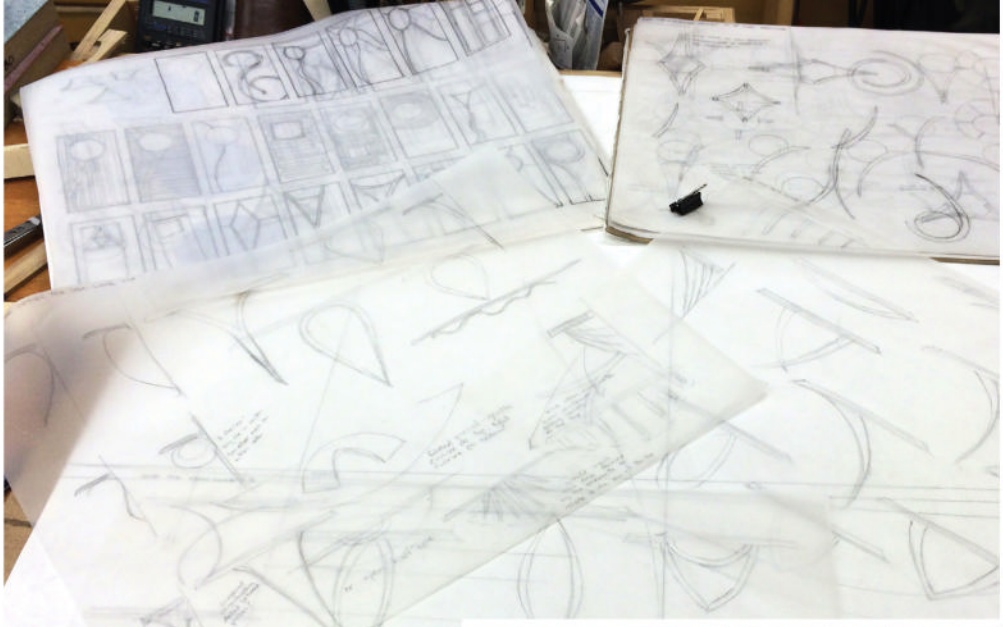
I sketch on tracing paper and find this advantageous for a couple of reasons. I often have an idea of proportions for an object so I will draw a 'bounding box'. Then I can overlay my tracing paper on my bounding box and draw within it. Tracing paper also allows you to quickly vary just one element of an object. For example, I could draw a tabletop, then vary the legs and apron using the tracing paper.

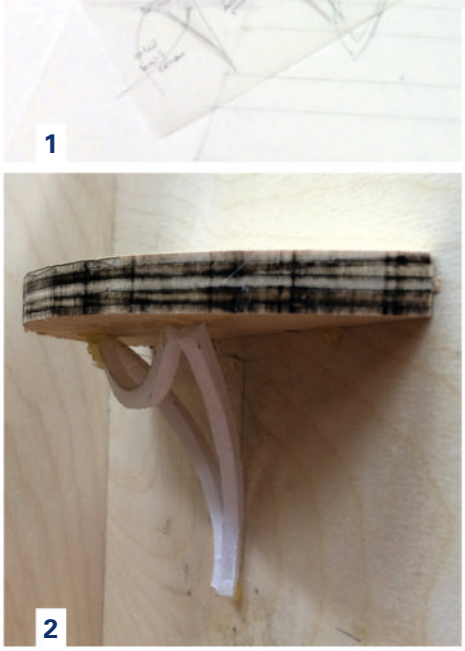
Modelling. This helps me quickly see an object in 3D and in a known scale. I use foam core, corrugate or MDF to quickly make quarter-sized models. Eighth-sized is too small to get a feel for the object and half-sized is often quite large and starts to feel like doll furniture.

I took my five favourite designs and made foam core models of them. Again, taken in variation, these five ideas gave me about 25 options. If I had five elements, what did it look like if they were the same length? If they got shorter towards the outside? Or curved in towards the wall, or outwards, or met at the bottom or the top? And so on…

This all goes rather quickly as I connect everything with hot glue. Once I decide on my next variation I dispassionately rip the model apart and hot glue it in the next configuration. I take photographs of every design variation from the front and from the side. Later I can look through the photos objectively and choose the design I'd like to pursue. Plus I have 24 other designs that I can use for a future table!

Mocking up. The next step was to draw the brackets in full scale. I started with the standard drawings





1. Initial sketches on tracing paper: each idea could be further explored.
2. Quarter-sized foam core model hot glued to my quarter-sized 'wall'. The bit that hung down in the front was left out.
3. Full sized mockup in rigid foam.
4. Pine prototype showing dowel detail – still big and chunky as the parts have not been shaped.
5. Detail of waterfall edge.
6. Side view of brackets on finished piece.

and quickly discovered that they gave me no useful information because the parts curved, splayed and tilted. I decided that what would help most was to do a full-sized mockup of the brackets. I used rigid foam for this. It's inexpensive, easy to cut on the bandsaw and can be quickly shaped. Once I understood my object and the intersection of the parts, I was ready to make a pine prototype.

Prototyping. This is the phase where I figure out the joinery, problem-solve the build process, make jigs and templates and work through any surprises that might crop up. Since I often work with curved elements, jigs are an essential. They help me hold odd-shaped parts and make machining processes safe and repeatable. Once the tricky joinery was figured out, all that was left was to shape the parts.

Making it. The final step is to build the object and is now relatively quick and straightforward with little room for error. Jigs that I built for a certain operation may be used again or modified to help hold parts as I shape them or glue up. I have been asked why I spend so much time building jigs that are just going to be used for one project. The fact is, I could not build the object with the level of precision I expect without them. And I think jig building is an essential problem-solving skill woodworkers need to hone, just like drawing or learning to sharpen your chisel.

Photos: Kelly Parker

Kelly Parker is a studio furniture maker and sculptor in Parkville, Missouri, USA. She will be in Australia as artist-in-residence at the Perth School of Wood in early 2016. Learn more about Kelly at www.woodsongstudio.com

Floralegium

Gray Hawk's cabinets are a homage to botanical artistry of Joseph Banks.

Shown here back to back, are two cabinets recently built by Adelaide wood artist Gray Hawk to house a rare set of prints of Joseph Banks's Florilegium, one of the world's most significant collections of botanical art.

Between 1768 and 1771 Joseph Banks, the famed botanist, accompanied Cook on his explorations of the Pacific Islands and the continent of Australia.

Sketches of Australian native flora by Banks and Daniel Solander were eventually compiled and copperplate engravings created. It was not until the 1980s however, that limited editions of Banks's Floralegium became available.

Flash forward to 2015 and Hawk's '2000 hours of blood, sweat and tears' during which new technologies of intarsia were explored, and have now resulted in the creation of two stunning cabinets.

Each cabinet is 2300mm high x 1700mm wide x 700mm deep. Extension drawers and desktops allow the storage and viewing of prints. Each cabinet holds 17 folios weighing 16kg each.

The cabinets are faced in Gray Hawk's signature bark-edged redgum veneers with panels of birch and intarsia made from Tas myrtle, figured blackwood, jarrah, ash, silky oak, ebony, rosewood and dyed limewood. Gray's design was based on actual botanical samples. The *Banksia Cabinets* are now part of a private collection.

Photos: Denys Finney

Learn more about Gray Hawk's work at hawkdesign.com.au

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