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Wood

REVIEW

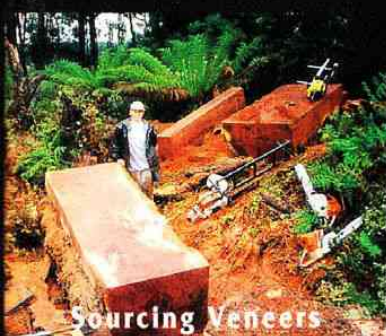
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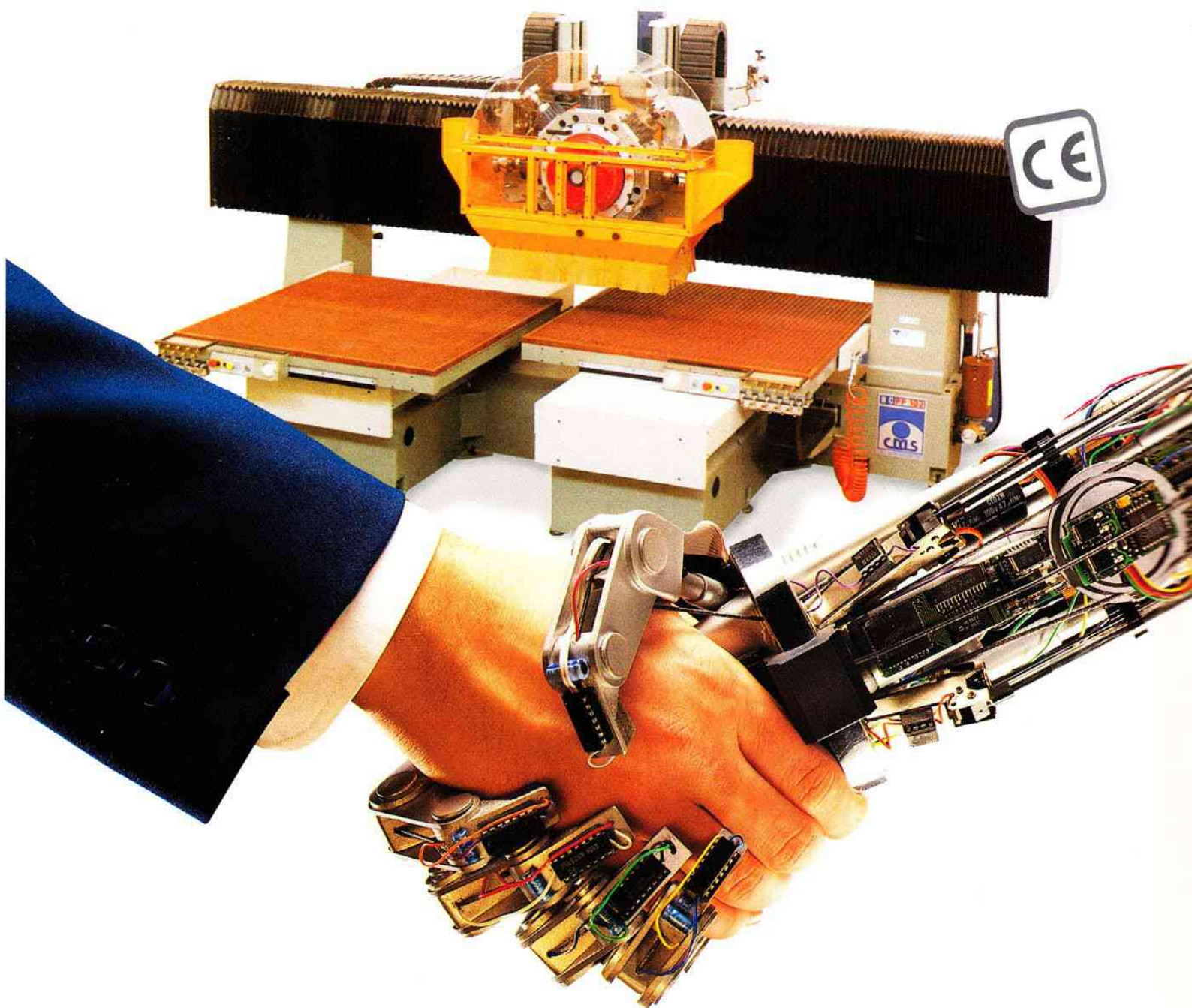
Dovetails: Hand vs Jig
Carving Claw & Balls
Veneer Source Chart
Making A Table
Block Planes
Dowel Joints
AWISA Preview
Router Cutters
Vacuum Pressing
Why Glue Sticks

Turning 'winged' forms, p.80



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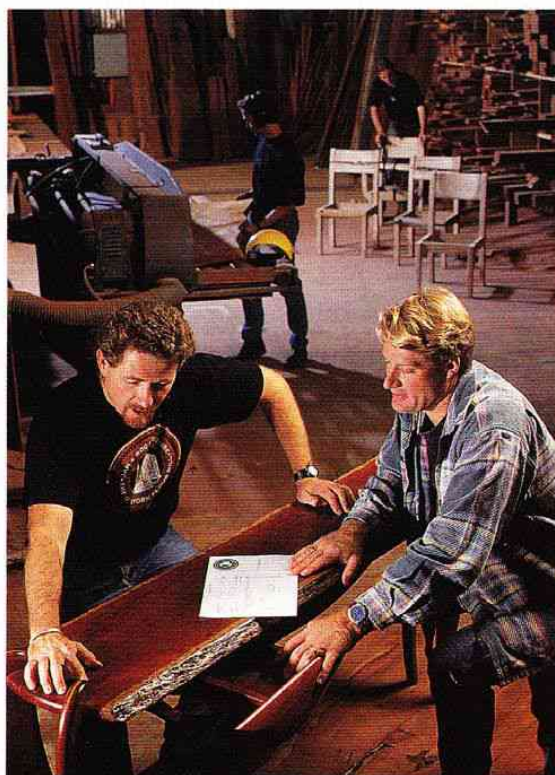
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Editor: Linda Nathan

Technical Editor: James Brook

Machinery Technology Editor: Philip Ashley

Regular Contributors: Anton Gerner, John McLennan, Stephen Hughes, Terry Martin.

Editorial and Advertising Enquiries

Tel (07) 3287 7088 Fax (07) 3287 7099

Administration & Advertising

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Cover: Turning a winged form

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EDITORIAL

Much of this magazine is taken up with the discussion of various kinds of technology, ranging from traditional methods and tools, through to the very latest. The pace of change is enormous but we can never afford to lose sight of what's gone on before. Our technological 'roots' so to speak provide us with a yardstick to measure and even question our progress by.

In the factories, workshops and sheds of this country (as in this small office) the imperative to update our technological resources is constant. Whilst we should accept the benefits this brings it doesn't hurt to have a look at some of the intangibles which can make all the difference.

With all the technology in the world it's pretty hard to get anywhere in life or work if you can't get on with other people. This issue contains profiles of two business partnerships which are remarkable for the creative output which has occurred as a result of them. The companies Jah-Roc and MAP are inspirational.

On another level, why is it that two makers can perform the same task, but one achieves superior results. Bob Howard talks about 'technique', what it is and how to develop it. Anton Gerner compares hand and machine techniques for cutting dovetails. His conclusions are fair—the old way is best when time permits, but for efficiency and speed the jigs are hard to overlook. New technology comes to the fore with our hands-on demonstration of vacuum pressing as it does in Rodney Hayward's story on adhesives and what makes them work—and fail.

Philip Ashley examines the router cutter and shows us what these masterpieces of tooling represent in terms of technological development. A visit to a router factory shows just what you are paying for each time you buy one.

We've gone to the source of the matter with our timber veneer reference chart. Veneers make the most of a precious resource. Consult our reference table on pages 60 and 61 to see what's available and where you get it from. This story is a must for makers, specifiers, designers and architects.

And for those of you who can't get enough technology don't forget the AWISA exhibition at Darling Harbour, Sydney in July. The equipment and technology revealed at this biannual exhibition set the pace for industry for the two years which follow it.

For the turners this issue Terry Martin shows how, in the course of trying to get the most out of square blanks, he has come up with a new way to turn. You might get inspired to think more 'laterally' yourself. We also have reviews of two recent woodturning exhibitions. Please continue to send in pictures and information about yourselves and the work you are doing, or drop us a line about any stories you would like to read in this magazine.

Linda Nathan, Editor.

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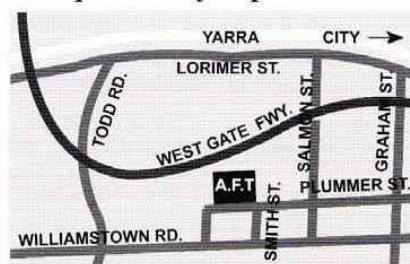
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EXHIBITIONS



Above: Vaughan Richmond's 'Mystic Tide', 330mm diameter, jarrah.

Below: Peter Lowe's 'Evolution Series—Kangaroo Paw', 300mm high, sheoak.

WEST AUSTRALIAN WOODTURNING

March, 1996

Claremont Showgrounds, Perth
Reviewed by Richard Raffan

The south-west of Australia is renowned for its jarrah and karri forests, its casuarinas and giant banksia nuts, for the plethora of timbers and associated industries, as well as for its wonderful environment.

Like Tasmania or Oregon, woodworkers are thick on the ground and a good proportion of these are woodturners who sell their work through the numerous craft shops and galleries located in the country timber towns which cater to the tourist trade. Rarely do you see the absolute best that these turners can produce in one place, but in Perth at the Working With Wood Show last March there was, tucked away along a wall, a fine



display of some of the best recent turnings created in Western Australia.

That the work was in the main conservative is probably a reflection of the taste of curator Nancy Launer. There were a lot of hollow forms with some interesting surface and rim treatments and/or carving on more than half the pieces.

Contenders for pick-of-the-show were, for me, several very stylish and classical hollow forms. Dean Malcolm's jarrah piece with its delicate flutes starbursting from the neck is wondrous. Or Peter Lowe's 'Evolution Series Kangaroo Paw' vase, or either the flatter 'Mystic Tide' or 'Coreolis' from Vaughn Richmond. These men cut into their turned surfaces to create curves which sit quietly on their pieces, conjuring up forms of exceptional serenity. All these

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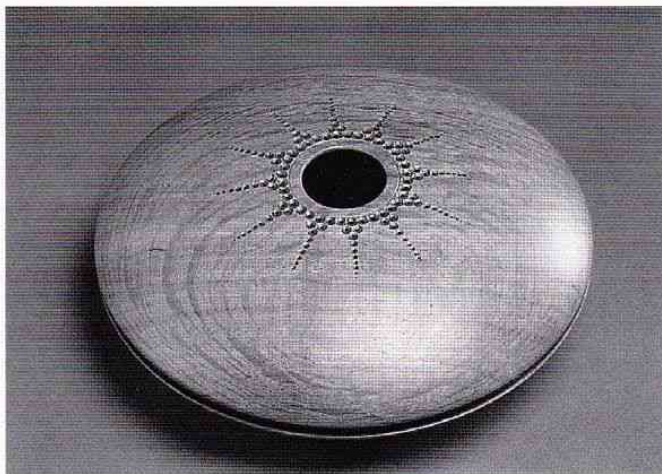
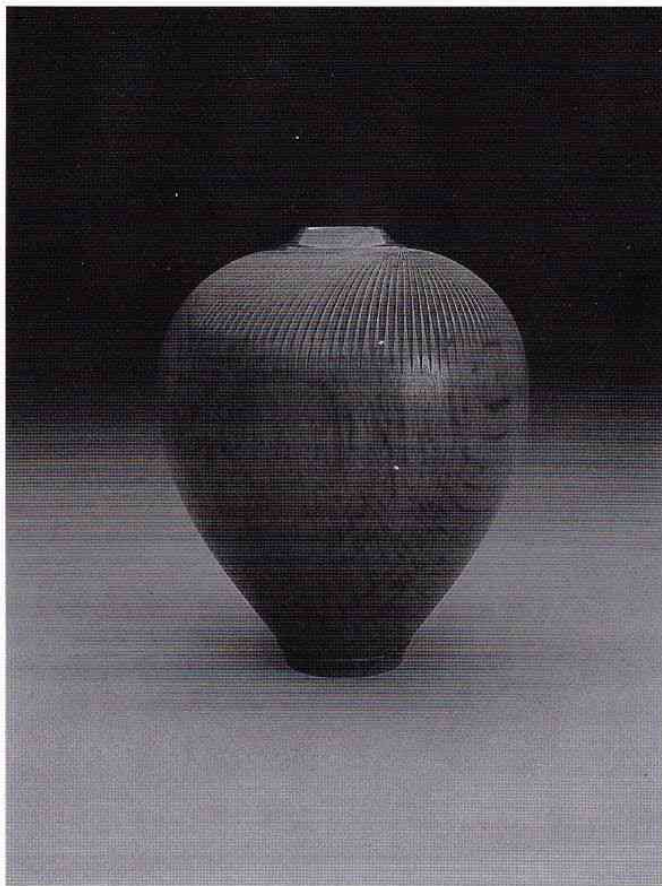
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Top: Hollow form by Dean Malcolm in Jarrah, 250mm high. Above: Form by Tony Milsom in sheoak and sea snake leather, 250mm diameters.

pieces are a delight to handle, being well-balanced in the hand and not too light in weight. They retain some warmth and woodiness.

Of the other hollow forms, that made by Tony Milsom needs to be handled. This is another well-balanced piece (one must comment on this because it's so rare) with a pierced sunburst around the opening which allows the light to form patterns on the interior, and these alter as the piece is tilted to the light source. A discreet band of snake skin relieves the otherwise stark profile. I also liked the way Jack de Voss carved his grasstree vase, especially in the way it crept from around the base—another variation on the starburst theme.

Yet more fine examples of the restrained use of carving featured on the fluted and immaculately finished production boxes by Dean Malcolm, which have four groups of vertical flutes on the concave sides which are echoed in the lid. Of the plainer boxes, Tony Milsom achieved a wonderful fit on his lidded bowls as did John Shinnick.

On the more practical side Peter McGinty showed a square edge myall dish with a sensible but still well proportioned foot. A nice piece which deserves to be used at the dinner table. Only Gordon Ward was nudging conventionalities. There was his beautiful and delicate 'A Poem': a thin green turned—and therefore warped—round bottomed bowl sitting on a turned and carved leaf motif tripod. There was his 'Swirl Bowl', a hollow form heavily carved around the opening and coloured to simulate a maelstrom, and his 'Moonscape'.

This was not a show for wood freaks, the only really flash piece being a camphor laurel hollow form which will have little to commend it once the colours have mellowed. Few of the objects needed to rely on glossy timber or some obvious virtuoso technique for appeal. More, I had sense that in this body of work these makers have the beginnings of what could be a distinct WA turning style.

If the members of the Woodturners Association of WA, who also had work on display, were to follow the lead of the Malcolms, Lowes and Richmonds, paying more attention to detail and to physical balance in their turnings, this exhibition could well set a new trend.

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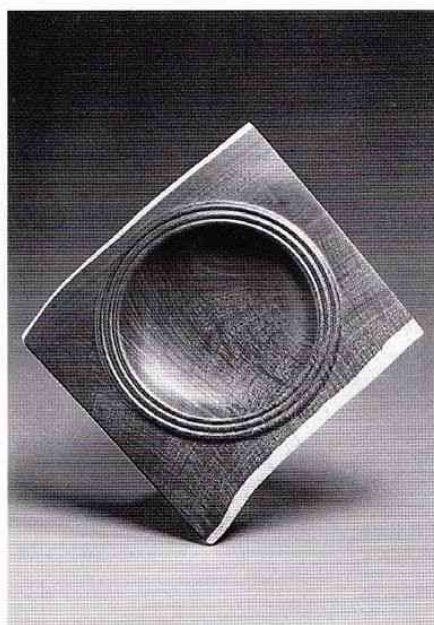
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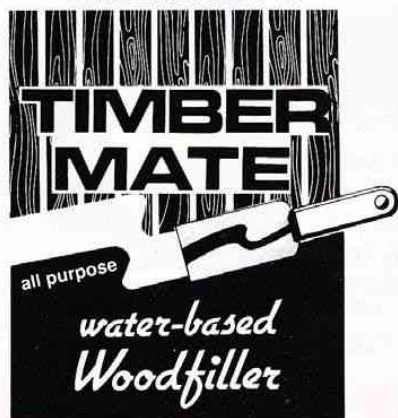
Right: 'Forest Mystique' by Brian Launer, 400mm diameter in sheoak.

Below: Turning by Peter McGinty, 200mm diameter in western myall. '...a square edge myall dish with a sensible but still well proportioned foot...'

Lower right: 'Moonscape' turned and sculpted in poplar burl by Gordon Ward (380mm diameter) whose works 'nudged conventionalities'.



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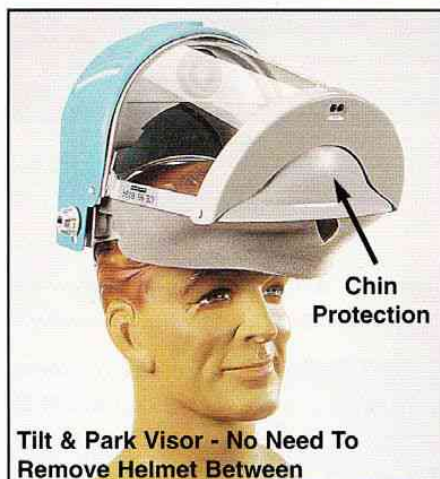
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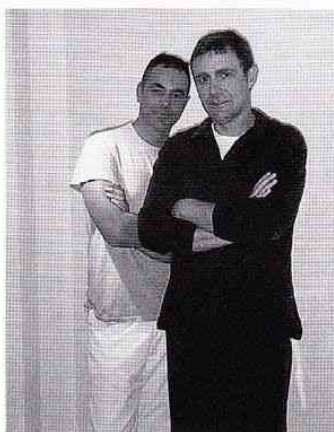
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EXHIBITIONS



Left, Christopher Connell
& Raoul C. Hogg



Right: The 'Pepe' chair which was launched at 'Furniture '94' in Melbourne is now an icon for MAP and has been sold throughout Australia, New Zealand, the US, UK and Singapore.

Top left: 'Plaky', a circular topped small table made of recycled plastic and virgin aluminium, is now mass produced, yet has gained a place in New York's Museum of Modern Art.

Left: 'Box & Dot' designed in 1994.



MARKING TERRITORY

Arts + Industry Gallery, Melbourne, March 1996

'A Decade of Work by Christopher Connell and Raoul C. Hogg, Merchants of Australian Products (MAP)'

Reviewed by Linda Nathan

Partnership has often been said to be one of the most difficult ways to do business. When it works, however, the results can be spectacular. The partnership that is MAP combines personalities and skills that are complementary and manage to nurture one another rather than vie for dominance. 'We're on the same vibe', says Hogg, 'often one will say what the other is thinking and vice versa'.

Christopher Connell (designer) and Raoul C. Hogg (production) are mer-

chants of Australian products—their own, that is. Their uncompromising aim is to design and make 'quality Australian product to compete against the best imports with the flexibility of local production and service at realistic prices', as the poster from their recent exhibition announces at length. And to the surprise of some, it has worked—not that it's been without, or even currently excludes struggle. Raoul C. Hogg, who recites affirmations for an hour each morning to get going with positive attitude, keeps the company on track, both production and morale-wise. That doesn't stop him, however, from getting 'bogged down' by the daily and growing paper war that an expanding business breeds. He admits to finding the administra-

tion side 'a bit crushing' and says 'we have to keep our focus on creativity'.

But while Hogg can see the business getting big, and Connell opines that 'things will get easier when we've got lots of resolved product', they're not in it for the money. 'At the end of the year our accountant may tell us we've had a bad year, but if we've developed five new products we're happy with, it's been a success for us', says Hogg.

Connell says 'other designers and students that visit here are amazed at our output. They look at what we're doing and say you can't do things like that, but we just say if you want to make something, *just go and do it*. When we have a new design it's just

like "quick, let's go and make it".

Hogg, a former mechanic and builder of swimming pools, and Connell, graphic artist and interior designer, are proud their credentials as furniture designers and makers are the result of trial, error and effort. They've made mistakes of course, but stand by their work to the bitter end: 'how can I sleep if something we've made isn't right' says Hogg.

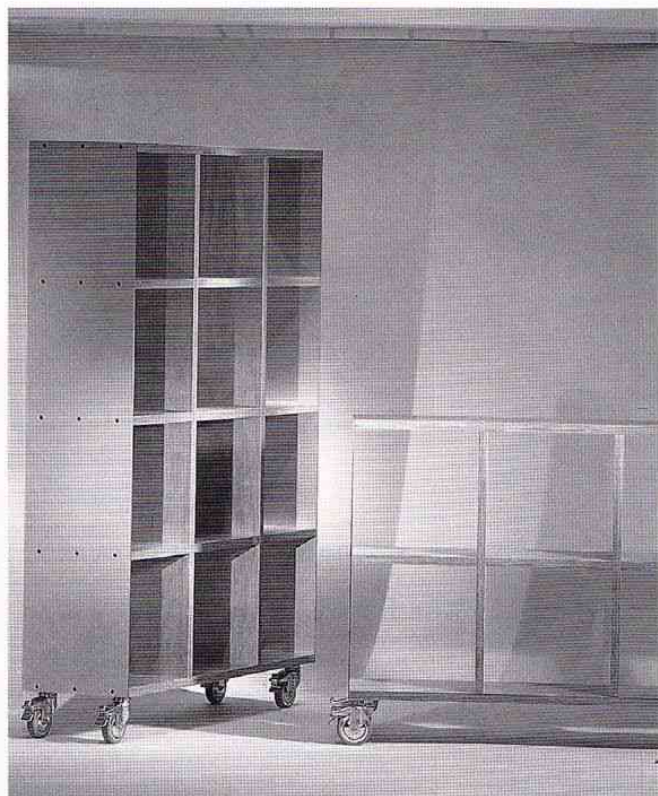
With product development Hogg claims 'we won't com-

promise, and we still believe we haven't given it our best shot.' Even mass produced lines get 'developed' again from time to time. Together for about ten years, Hogg and Connell claim to have gotten 'serious' about four years ago and are now producing for what they identify as a surge of demand for product on the marketplace'.

The Chapel Street studio is the centre of the operation. Manufacture takes place via numerous subcontractors who can ensure the right quality on time. The partners are on call to maintain the flow of production and deal with problems which arise from time to time. Around 50% of sales take place from the spartanly chic Chapel Street, Toorak studio. Other work is done for designers, decorators, architects and individuals who want something different.

The recent exhibition at Arts + Industry's Latrobe Street gallery is peer recognition of what has been a prodigious output. Tables, sofas, shelving systems, and chairs lined the entire length of the exhibition space marking the evolution of forms from prototype to production item. Pared of excess, the lines and curves of their furniture show hours of drawing board refinement from the pencil of Christopher Connell. There are chairs in metal, cane, timber, ply and plastic that stack or stand alone. Tables to match are circular and curve-topped with legs or interesting bases. Economical of form and materials MAP furniture is always user friendly. MAP stands for action, and the company's recent retrospective is living proof.

'Roller Boy' is a storage system on castors made from marine ply and alucabond with wide ranging applications. Below: 'Oak Chair' and 'Oak Table' sell quite reasonably for around \$320 and \$1600 respectively and are popular for both domestic and commercial usage.



By Charles Sale

CARVING CLAW & BALL LEGS



Fig.1

Last issue Charles Sale demonstrated how to construct a single pedestal oval table which featured claw and ball legs. Here he describes how to carve the legs.

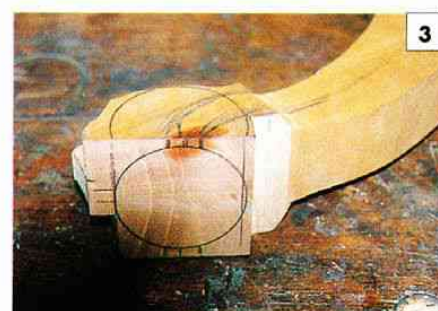
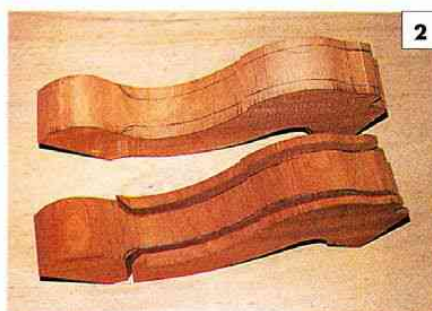
The claw and ball foot was popular during the early 1700s and evolved further during the reigns of George I and George II up until the 1750s. It is commonly thought that Thomas Chippendale developed and refined this design, which was in fact less fashionable in this period than

other styles of leg (spade foot, scroll foot, tapered leg). American colonial furniture lagged behind the trends of London, and so the claw and ball form continued to develop in America until the last quarter of the 19th century.

Despite the regional styles and variations which have developed over time,

the method of carving has remained the same. The type of leg demonstrated here is a combination of personal taste and the influence of others I have worked with over the past sixteen years.

The sizes given follow on from the first part of this story in the last issue



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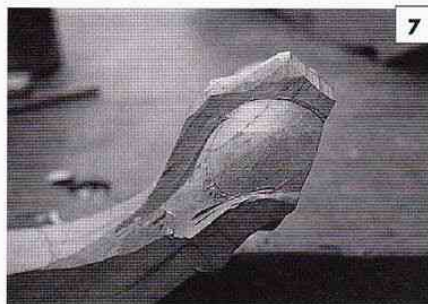
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where the top and understructure of the table were constructed. The dining table legs are cut from 75mm thick stock onto which I laminate 12mm pieces at the foot section to produce a well proportioned leg. Sizes for an occasional table leg are also given below in brackets. For an occasional table, I have used 75mm stock, but 50mm material can be used with a lamination of 10mm at the foot section.

1 To make a template, follow the line drawing (fig.1), which is laid out in 25mm squares for dining table size, or 19mm squares for occasional table size. Place the template on the blank, ensuring that the grain direction is aligned to minimise the amount of short grain at the ankle, and outline in pencil (photo 1). Use a bandsaw to remove the waste and plane ends square across

the face and to each other (photo 2).

2 Draw an 80mm (60mm) circle on the foot end and sides. A round plywood template makes this easier, especially on the side sections (photo



3). Mark out the position of the centre talon approximately 20mm (16mm) wide and use a 10mm veining chisel outline this to a depth where two thirds of the ball will be exposed (photo 4).

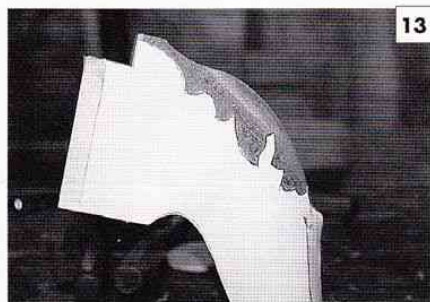
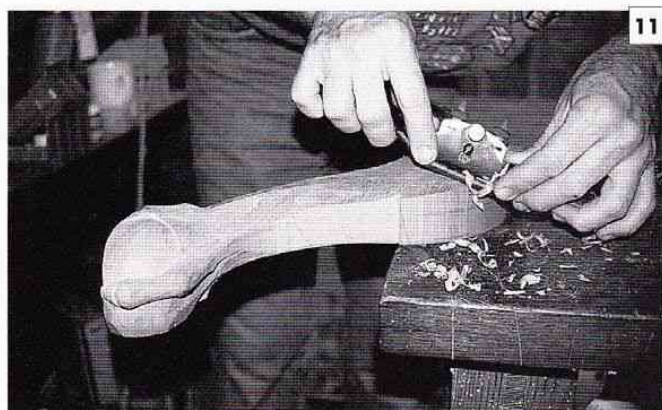
Now carve a cylinder shape across the foot—I use a #3 chisel for this (photo 5). The two side claws are positioned a little further than a quarter the way around the circle from the position of the centre claw. Continue

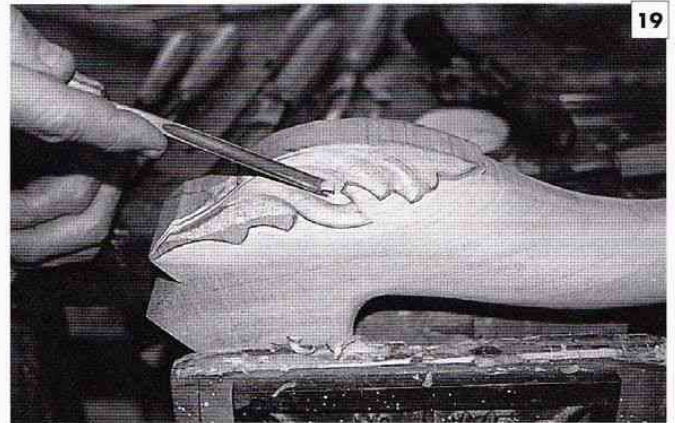
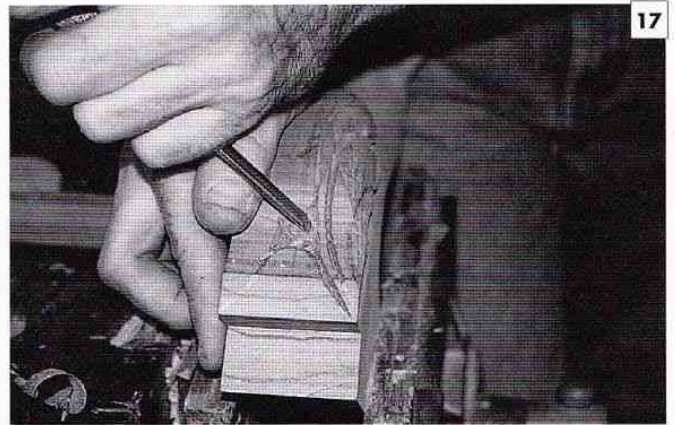
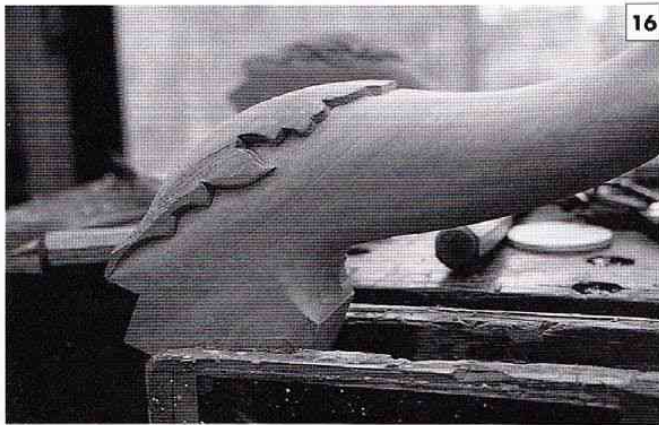
the V-cuts into the ankle area, gradually lessening them in depth. You may have to use a mallet, depending on the timber you are using.

3 The next step is to shape the ball and claws. Using a medium width #3 gouge, begin shaping the ball, remembering that we are representing a sphere and it is important to keep viewing the foot from all directions to

keep the shape of the ball true and accurate. The depth of the claws must follow the ball radius and adjust where necessary (photo 6).

The claws at this stage retain the original





bandsaw outline. They can now be trimmed down to an approximate height of 14mm to form the knuckle and connecting bone structure. Take time to shape the claws from the ankle down to the knuckle above the nail, the slight hollowing between the knuckles requires careful cutting on both directions as the grain orientation is the same (photo 7). A medium width #7 gouge can be used across the grain to assist in this operation. The length of the nail (or claw) will be about 15mm and I prefer to trim them 3 to 5mm from the bottom of the ball so they will not be damaged by catching on carpet. You can use an 8mm, #5 gouge to shape the nail (photo 8).

4 After nail cutting, pencil in the web curve which runs from the first knuckle of the centre talon to the beginning of the side talon nails. A #4 or #5 gouge about 15mm wide should be close to the desired radius. Tapping with a mallet will assist in a clean parting cut to raise the web about 2-3mm above the ball (photo 9). A medium width #3 gouge will be used to shape the ball up to the web, removing any bumps or imperfections to produce a true sphere. Continue carving the foot area, up to the ankle until satisfied with the shape and form of the ball (photo 10).

5 Round the remainder of the leg from the foot up to the knee with a spokeshave and chisel. (photo 11) Keep forming the leg, the ankle should be round whilst at the knee the shape is an oval. Take your time to produce a smooth, flowing shape (photo 12).

6 Sand the leg at this point even if you intend to add the carved foliage to the knee. In this way you will be able to

sand freely without damaging any carving detail (photo 16 shows the sanded leg, after foliage has been applied).

7 If carving is to be applied to the knee, produce a foliage pattern to your liking and pencil in the outline (photo 13). You can set in your pattern using medium width #2 and #3 gouges and ensuring the overall effect is of foliage resting on top of the leg shape. Setting is the defining of the carving's broad outline. Cut this in with the chisel to a depth of about 3 to 5mm. Follow the shape with a combination of #5 and #7 gouges of 6mm to 15mm in width using concave and convex cuts. (photo 14). Next carve in towards the 'set' outline to the same depth, around 3 to 5mm (photo 15).

The foliage begins to form quite quickly, but remember to keep the edges crisp and smooth. Carving like this takes practice. The essence is to maintain a smooth, even flow to all curves. We are dealing here with light and shade. With practice you will achieve good results, however practise on scraps first. (Photos 17, 18 and 19)

Tool Maintenance

In my opinion, the least observed, but most important facet of working in wood is care and maintenance of hand tools. If the cutting edge of your carving chisels is not maintained the finish off them will be inferior and you will suffer the frustration of chips and breaks. I use a whetstone sharpening system (Tormek) in combination with continual stropping of my gouges on a leather strap to maintain good condition.

Charles Sale is a furniture maker who makes to commission and conducts adult education courses at Brisbane Institute of TAFE.

Greening Far North Queensland

Cairns recently played host to the Timber Expo 96 whose theme 'Creation and Re-Creation with Timber' promoted the use of North Queensland timbers. Noel Briggs from the Community Rainforest Reforestation Program was involved with the organisation of the expo. 'A lot of people are scared to use timber because they think it's a finite resource. But it's one of the most versatile materials available and it's renewable. There are now thousands of trees growing in plantations from Cooktown to Mackay and throughout the Tablelands'.

The CRRP has been responsible in recent years for the plantings of around 6.5 million trees in almost 13,000 hectares of plantations. The scheme is a joint farm forestry initiative between landholders and Federal, State and local governments aimed at establishing plantations of valuable cabinet timbers and other timber trees on freehold land in North Queensland. It operates in the high rainfall belt between Cooktown and Mackay and concentrates on rainforest species.

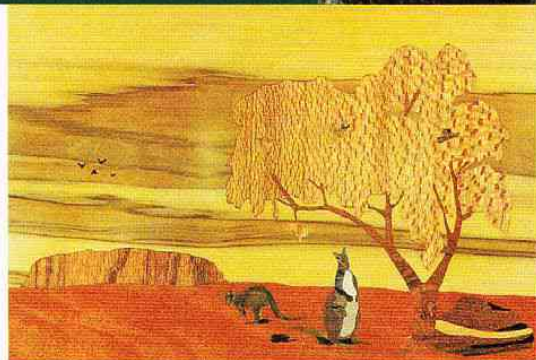
Private landholders with more than two hectares available for trees can contact the DPI (Department of Primary Industries, Qld) which assists with advice on the best methods of utilising the area and the types of suitable trees. With technical assistance from the DPI the landholder prepares the area, while tree planting and maintenance is a cooperative effort between the landholder, the DPI and local trainees in employment training schemes. This continues until the trees are established (one to three years) after which the care of the trees are the responsibility of the landholder. There are currently 498 landholders participating in the scheme who are planting both hoop pine and rainforest species such as red cedar and Queensland maple. For more information regarding the CRRP contact Brian Lamprell on 018 187715.



A mature stand of hoop pine on the Atherton Tableland.

Marquetry Takes Hold

Marquetry is gaining popularity. The Marquetry Craft Co have a new range of products, including D.I.Y. marquetry kits, exotic veneer leaves, inlays and stringing and everything else you need to produce first class work. A colour catalogue is available for \$5. Call (044) 234 717.



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Glue Breakthrough

3M have launched a new product which they claim will revolutionise assembly. Components which have been applied with the new *3M Jet-Weld* product can be assembled after only 30 seconds. 3M claim this will permit significant productivity increases and reduce clamping up times. The Jet-Weld system combines the speed of a hot melt adhesive and the strength of a two-part structural adhesive. The glue system is applied via an applicator gun and includes adhesives for timber, rubber, painted metal, fabric, steel and many plastics.

For supply details call Cherie Barber (02) 498 9314.

Supplying South Australia and Beyond...

The largest supplier of machinery and equipment in South Australia is David Trembath Agencies, member of the Woodman Group of suppliers. The company stock a full range of electric tools, air tools, power tool accessories, fastening/anchoring systems, Woodman woodworking machinery, plus an almost alphabetical listing of woodworking supply brand names: including: *Airy, Armeg, Biax, Bi-Matic, Blu-Mol, Broset, Cengar, Chieftain, Craftsman, Derossi, Dustmaster, Esta, Evanson, Fiam, Freud, G.L.S., Indasa, Jumbo, Kaso, Kreg, Lacimar, Lazzari, Magic, Nile, Performax, Remgrit, Routermaster, Silverglide, Star, Strata, Scheer, Shinano, Socomec, Terrco, Unibeam, Vonarx, Woodman, Youngman* and more... Call David Trembath Agencies on (08) 346 4561.

Cleanliness First!

Keeping the workshop sterile is asking a little too much but Record have

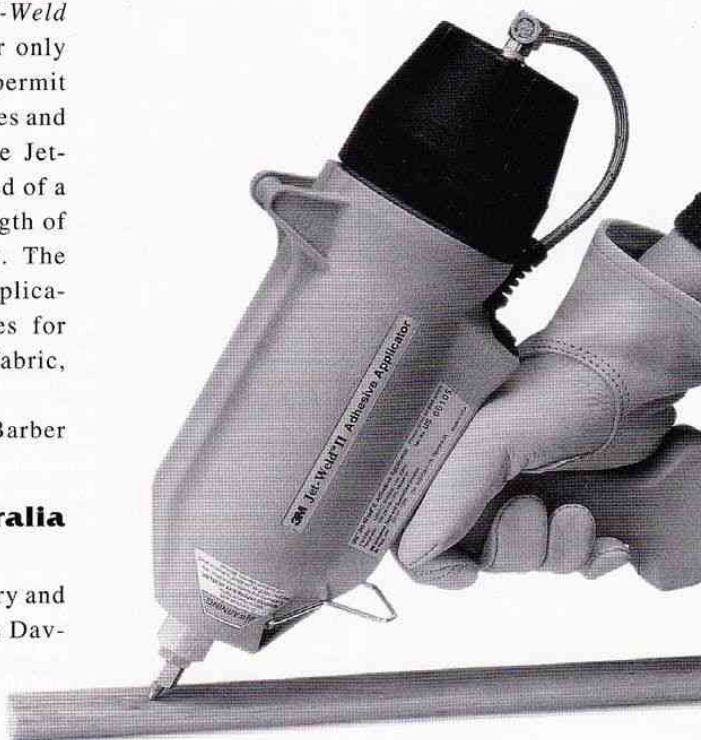
just released a new portable dust extraction system which claims hospital standards of filtration. The system adapts to both woodworking machinery and power tools and, as if that isn't enough, doubles as a workshop vacuum cleaner for offending piles of chips and shavings.

A paper filter needs changing about once a month, depending on usage. The motor has a two year guarantee and a life expectancy of 2,000 work-

to their well-equipped wood workshop. The latter was formerly available to only a handful of designers in residence with the council's Design for Production program.

The facility is equipped for processing both solid timber and veneered or laminated boards, and is fully ducted for dust extraction. New equipment is being introduced continually, and the community is encouraged to offer suggestions for future purchases. It is hoped that the floor plan and capability of the workshop will be expanded in late 1996 to include metalworking.

The workshop is available weekdays from 9am to 5 pm by arrangement. The fee for use of the facility is \$2 per hour plus the cost of any con-



3M's Jet-Weld New Glue System

ing (about five to ten years average use). Call Record on (02) 748 6800.

Work Wood At Ipswich

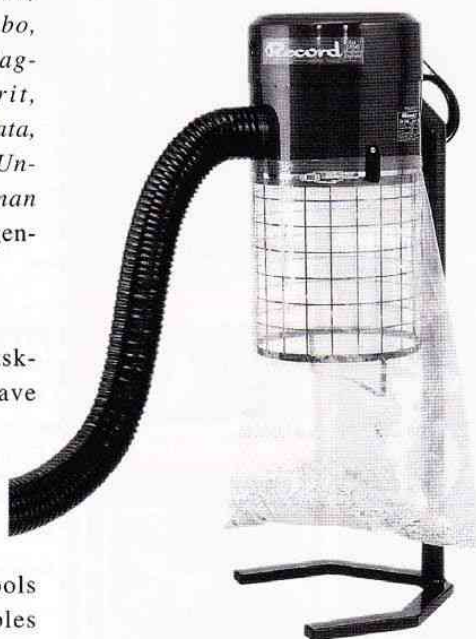
Ipswich City Council in Queensland is now offering designers, craftworkers, artists and woodworkers access

sumables. For further information contact: Steve Curran: Tel: (07) 3202 2882 or 0419 661153.

New and Updated Machines

Hegner have brought out an updated model of their Precision Table Workshop MK-4. New features include a router fence, a drill table for its precision chuck and an optional sliding table attachment. This is a small, multi-purpose and cost-effective unit which permits sawing, routing, drilling and turning operations. Available from *Mik International* (08) 333 2977.

Two new *Hafco* machines are now available from *Hare & Forbes*: the ST10 sliding table saw and the PT200 planer. The ST10 saw has a 10" tilting saw blade, 2hp 250 volt motor, cast iron table, work clamps, dust chute and rip fence. The PT200 planer is a 200mm/8" model driven by a 2hp 240 volt motor and has a 1340mm cast table with the ability to do a 12mm



Record's new DX 1500 Dust Extractor

rebate. Hare & Forbes (02) 633 4099.

Block Plane Blades

Replacement plane blades for block and bench planes are available from Garrett Wade Australia. These are available in laminated steel from Japan to suit most models. Hock superhard handmade blades are worth trying too. Call 1-800-33-77-36 for information.

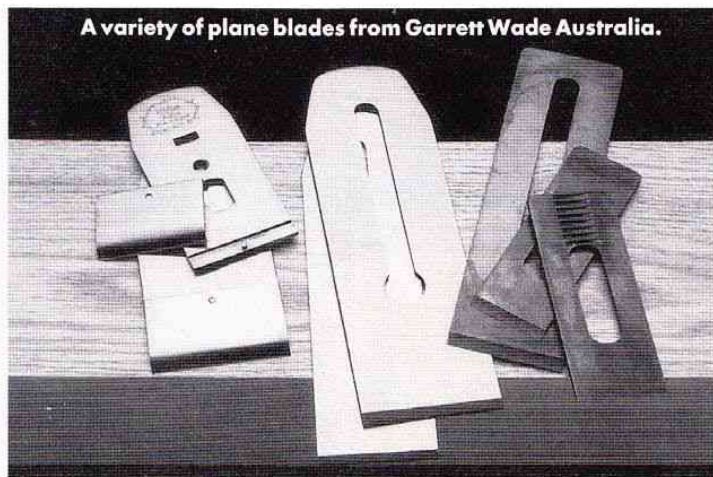
Veneer Edging

Superthick Veneer edging is a natural timber veneer edging manufactured in 100 metre long rolls. Laminated from six layers the finished edging is 3mm thick and can be used instead of traditional solid timber edge strips. This product is made in Germany and is selling well in Europe, the US and Asia. Call Howard Silvers on (02) 743 8400 for supply details.



Woodman's BA 218W bandsaw

A variety of plane blades from Garrett Wade Australia.



US turner Dennis Elliott recently held a 'solo show' in New Milford, Connecticut, entitled 'As The Wood Turns'.

The Workshop Essential

The bandsaw is one of the most versatile cutting tools in the workshop. From deep ripping, circle cutting, or fine joint cutting the machine is virtually indispensable to manufacturer, woodturner, craftsperson and hobbyist alike. The Woodman Group stock a number of different bandsaws, however the best value for money machine they have is the BA 218W. The saw has a massive 11" cut height and throat depth of almost 18" inches. All moving parts are balanced and optional table extensions are available. Currently these saws are selling for under \$1800 (inc tax). Call your nearest Woodman store (03) 9885 6104, (02) 708 3233, (07) 3844 4433, (08) 346 4561, (09) 272 3844.

Wood Review at AWISA & Sydney Wood Show

Wood Review will be on stand no. F5 at AWISA. Please visit us there if you have products or services which you think may be of interest to other readers. Feel free to drop by for a chat either at AWISA or at the Sydney Wood Show where we will also have a stand.

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Need Some Pine?

Charlie Henry Timbers in Salisbury, Queensland is one of Australia's largest suppliers of hoop, radiata and slash pine. The company, whose yearly turnover now totals around \$8 million per annum, was established in 1976 and now co-ordinates production, machining and delivery of pine throughout Australia. Deliveries take place daily anywhere from Darwin to Perth ex the company's own mills or warehouse stock. In addition to pine for furniture, panelling, moulding, flooring, construction, and packaging requirements, the company stock Victorian ash sawn or dressed. For wholesale and trade enquiries call (07) 3274 4111.

Sharp Fingernails?

The release of a new accessory for Tormek sharpening systems should please woodturners. A new fingernail gouge jig makes sharp edges for these tools simple. Call Promac for details on (07) 3279 4811.

CUTTING DOVETAILS: THE HAND VERSUS THE JIG

For lasting quality in solid timber carcasses and drawers, dovetails are hard to beat. They offer exceptional mechanical strength, a large gluing surface and an appearance which is in itself synonymous with fine wood-working skills.

The only downside of dovetail joints is the time involved in accurately cutting and fitting them. Although I like to cut dovetails by hand, both for the pleasure of cutting them and for their look, economics have led me to look at ways of doing it faster, while still maintaining quality in production work. Machine cut dovetails can tend to have an overly perfect look to them. The beauty of hand cut dovetails derives from their varying angles and proportions which can be tailored to suit individual projects.

Both hand and machine cutting methods have their place. For this article I have summarised my own hand cutting methods and also reviewed some of the purpose built dovetail jigs available on the market.

CUTTING DOVETAILS

I use dovetails extensively for drawers and in the construction of some carcase work. The cutting by hand of these joints is time consuming, so any way to speed up the process without compromising on quality has to be

looked at. I find the bandsaw is very fast for removing waste, and a very fine cut can be achieved with correct blade set up and a consistent feed rate. I use the bandsaw for all my dovetails except for very fine ones where I use a Japanese Dozuki saw. For the cutting of blind dovetails where you cannot cut all the way through I



The Keller Jig

use the router freehand to remove the waste working back to the marking lines. Some people use a drill bit for removing waste, but I prefer to use the router as it leaves a cleaner flatter cut that is much faster.

For marking out I use a Bridge City dovetail gauge and scratch awl, an engineers square and a standard marking gauge with a modified point, shaped and sharpened into a small knife blade. I adjust pin spacings by eye to suit the depth of the drawer or carcass side and use a pair of dividers to ensure even spacings. The only really specialised tool I use is a homemade fishtail chisel, which I use to get into the corners when cleaning up blind dovetails.

There is a lot of debate amongst woodworkers about whether to cut the pins or tails first when cutting dovetails by hand. Personally I find it much easier to cut the tails first then accurately mark from these with a sharp marking knife to locate the pins. I then remove the waste and slowly clean back to these marks checking the fit as I go until the joint just pushes tightly together by hand.

HAND CUTTING TIPS

- Always remember to allow plenty of time for the fitting of dovetails. To achieve a really good fit you must have full concentration on the task at hand and not be in a rush. Remember, a tight fit is what it's all about.
- In softer timbers a hammer may be used to assemble tight fitting joints that cannot be pushed together by hand. You may leave the pins protruding slightly and then hammer over when the joint is glued up if small gaps are present. When planed back a tight looking joint is seen.
- To ensure the faces of a join are straight and square, clamp a guide block onto your work exactly on the line where you want to cut. This acts as a guide for the chisel to rest against when paring down and provided you keep the chisel against it, you can't go out of square.

DOVETAIL JIGS

The three jigs I tested for this article all work on basically the same principle: a jig holds the timber to a guide system which the router follows using a template to cut both the pins and tails. All of the jigs tested came with 1/4" shanked bits. I know these allow for a greater range of routers to be used, but they do seem to be somewhat lightweight for the cutting operation required of them. I found that even when cutting slowly these bits seemed to vibrate a little—I feel 1/2" shanked bits would be better.

I tested the three jigs on some spare 150 mm wide ash as if for a drawer side. The accuracy of the jigs seemed to more or less correlate with the cost of each unit.

Once the jigs were set up the actual cutting operation took about the same amount of time for each jig. The Leigh was the easiest to use as it offered the most support for the router. In terms of finish the Leigh was the clear winner, although the Keller was the simplest of the three jigs and

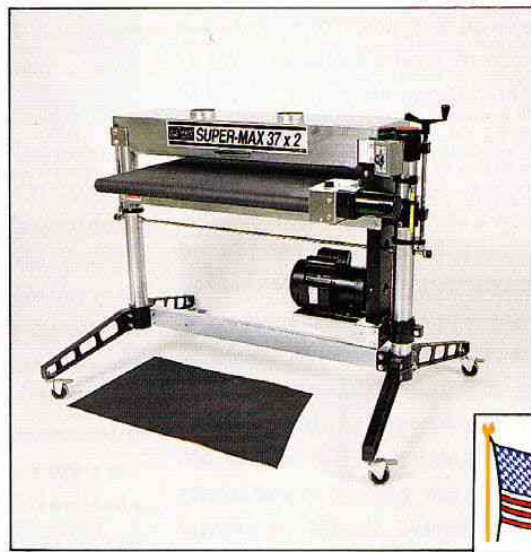
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DUST HOOD: Model 25 & 25x2: Steel hood with 4" vacuum port, hinged back.
Model 37 & 37x2: Two 4" vacuum ports.
DRUMS: Model 25: 5"x25" Model 25x2: two 5"x25"
Model 37: 5"x37" Model 37x2: two 5"x37".
Extruded aluminium, precision machined and balanced, 1600 RPM.
BEARINGS: All models: 1" sealed, permanently lubricated, ball bearing.
ABRASIVE STRIPS: Mod. -25 & 25x2: 3" wide x 11'6" long.
Mod. - 37 & 37x2: 3" wide x16'9" long. 3" wide cloth-backed abrasive, X weight. Fasteners accept any grit. No felt, velcro or adhesive necessary. One strip per drum included.
CONVEYOR BED: All Models: Steel conveyor bed reinforced with 4 steel cross sections.
CONVEYOR MOTOR: All Models: 100 in./lb. torque, direct drive D.C. motor (1/20 HP).
Infinitely variable 0-15 feet per minute.
CONVEYOR BELT: All Models: 120 grit abrasive conveyor belt included. (Polyurethane rough top belt available.)
STAND CONSTRUCTION: All Models: Cast aluminium, zinc-plated steel, Column tubes are centreless ground.
DRIVE MOTOR: All Models: 5 HP; TEFC; 2800 RPM; 240 volts; 50 HZ.
MIN. STOCK LENGTH: Models 25 & 37: 2'-1/4"
Models 25x2 & 37x2: 3"
HEIGHT ADJUSTMENT: All models: 3/32" per turn; Depth gauge included.
STOCK THICKNESS CAPACITY: All Models: 4" (12" extension model available).
SHIPPING Wt: Mod: 25: 300 lbs. Mod: 25x2: 325 lbs. Mod: 37: 350 lbs. Mod: 37x 2: 380 lbs.
DUST COLLECTION: Mandatory. Min. CFM: 25" drum - 600 CFM; 37" drum - 1200 CFM.

Please contact your Australian agents...



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was also well finished and machined. One point to remember with any of these jigs is, unless you plan to cut more than one set of joints (a drawer for example), it is usually quicker to cut by hand. To achieve accurate spacings and good fitting joints with dovetail jigs you must set up your router accurately and make test cuts—this takes time.

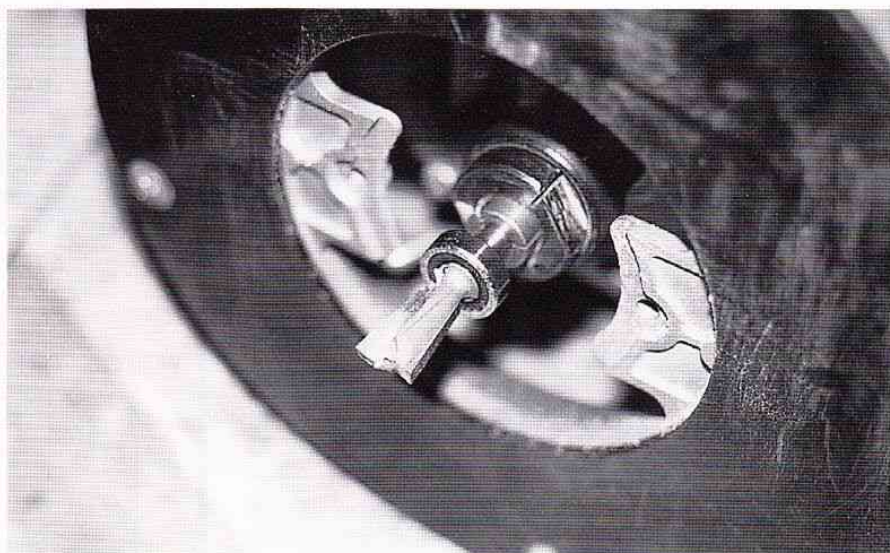
Routers

When using any dovetail jig it is important to ensure your router bits are very sharp to produce clean tight fitting joints. Remember that repeated sharpening of router bits can reduce the cutting diameter, so always test cut after sharpening.

When testing the dovetail jigs I found it was important to make sure that the router was properly seated against the jig. The slightest rock to one side resulted in a poor fitting joint. Even pressure must be applied directly above the timber being cut. Try not to cut too much in one pass with the router as this can cause the bit to vibrate from being under excessive pressure. This is especially so on the Leigh jig where large spacings are possible and a number of cuts are required.

Leigh D4 Dovetail Jig

The Leigh jig comes with a very detailed



instruction manual (166 pages), the size of which is initially somewhat daunting. While reading through it though, I found it to be very clear and easy to follow. It covers all aspects of the Leigh jig from set up through to the cutting of different joints, safety notes and other tips. Symbols and codes throughout the manual make set up very easy. An instructional video is also available.

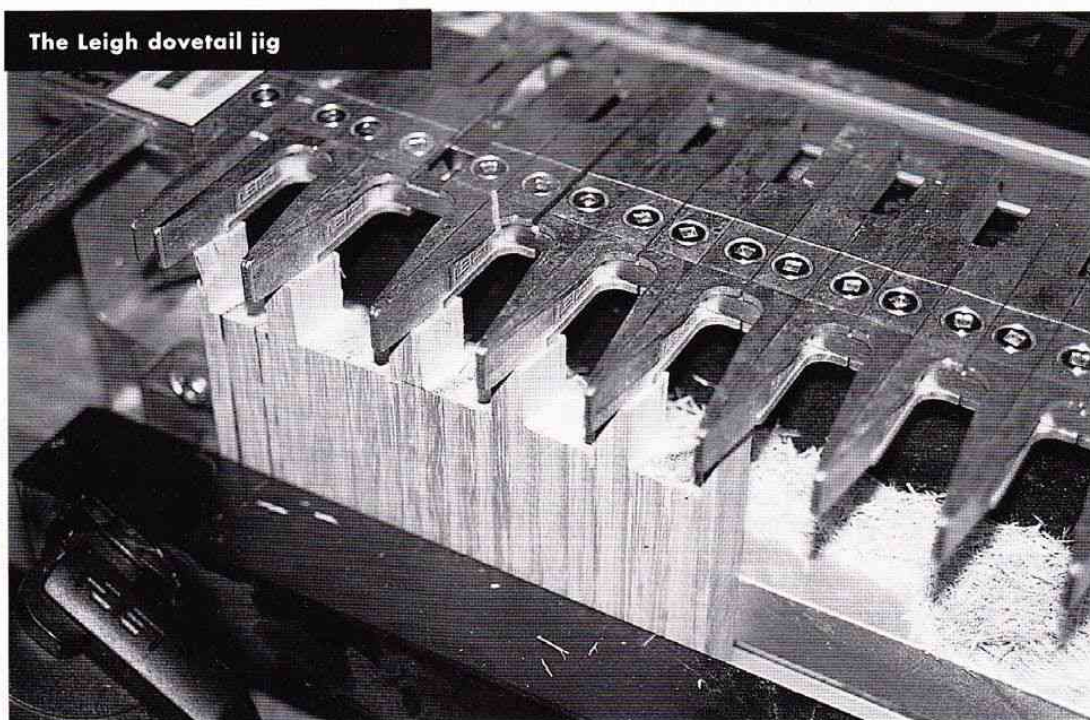
The real benefit of the Leigh D4 dovetail jig is its flexibility. Through dovetails, half blind dovetails, sliding dovetails and even more complex operations such as variable pin spacings and angled dovetails are all easy to set up once you have a good under-

standing of the jig and its operating techniques.

With this jig, if your joints are too loose or tight, you can adjust the fit to suit, which is often necessary with re-sharpened cutters. The pin spacing is also adjustable, which allows you to adjust the joints to suit your project.

Because the template guide is on the router, Leigh makes a large range of guide bushes to suit just about every router on the market. This jig is for anyone who wants the flexibility of variable pin spacings, a range of joint options and accuracy in cutting. It would suit anyone from the home hobbyist to the small production shop.

The Leigh dovetail jig



For its ease of set up and accuracy it represents excellent value for money and would easily pay for its self over time if you cut a lot of dovetails. The model 24 Leigh sells for around \$750.

Taiwanese Dovetail Jig

You will find this jig available from various outlets wearing different badges, but they all apparently come out of the same Taiwanese factory. Well-priced at around \$162, the jig offers fixed pin spacing for blind dovetails in timber up to 32mm thick and 300mm wide. I found this jig fiddly to set up—trial and error being the only way to achieve reasonable results. After some experimenting I found that with my router I had to use a packing piece of timber on top of the timber I was cutting in order to raise the finger guides to a height which allowed the router bit to clear the jig.

Once the jig was set up and I cut a few test pieces I was somewhat disappointed with the fit of the joints cut. The width of the sockets in this jig is determined by the width of the guide fingers which the router follows. If your router bit doesn't match the finger width exactly your joints will have a loose fit. This is what happened to me. However, I went back to the dealer who went through the whole operation with me and the

results were very good.

The jig is a little lightweight, so I found the weight of the router actually caused the finger guide to flex. To ensure this doesn't affect the joint accuracy a very even pressure had to be applied directly above the centre of the timber being cut. The instructions are very poor, the translation sometimes not making sense, maybe this is where some of my problems arose with the jig.

Once set up and some practice hours are under your belt I believe the jig will perform adequately, although not on an everyday use basis. This is a home hobbyist or part-timer tool.

Keller Dovetail Jig

The Keller dovetail jig is so simple it almost impossible to achieve bad results. It consists of two precision machined aluminium template guides onto which you are required to make solid timber guides. These are used to clamp the jig to the timber being cut. You can make these really deep if you like to ensure the jig remains square and securely fixed to the workpiece.

The fit of joints can be adjusted by sliding the aluminium template back and forwards.

I found the Keller jig to be very stur-

dy, easy to set up and use, and of overall good design. The versatility of this jig, despite the fact that it will only cut through dovetails, would allow for the cutting of anything from small jewellery box dovetails to full width panels up to 600 mm wide. Good value for money at around \$435 (16" model).

GLUING UP DOVETAILS

As with any gluing operation allow plenty of time for gluing up dovetails and always dry clamp before applying any glue, although repeated assembly and dissassembly will compress the wood and may affect final fit. Always make sure to apply a thin even coat of glue to all surfaces. I find a small brush makes this very easy and quick. When it comes to actual clamping specially made blocks can ensure direct pressure is applied to the tails, which is not possible if your pins protrude past the face of the surface being clamped. These blocks also distribute the clamping pressure which means you often need less clamps.

Dovetails offer strength and look good in both traditional and contemporary work. The jigs reviewed here are a good way to speed work and take out the tedium, but when time is not a problem, handcut dovetails are, to my mind, hard to beat.

Leigh and Keller jigs supplied for this story and available from Carba-Tec Pty Ltd, 1-800-658 111.

The Leigh Dovetail Jig is imported and available from M.I.K. International (08) 333 2977.

The Taiwanese jig is sold in Australia under various badges.



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ROUTER CUTTERS

The hardest working tools in the woodworking trade are undoubtedly router cutters. Routers are used to cut rebates, grooves, simple and complex profiles, mortise and tenons, plunge cuts and laminate trimming. You can buy an electric router for a few hundred dollars, or spend several hundred thousand dollars on a machine with full computer control. At the heart of all cutting operations is the cutter—the machine is only a means to get the router bit to the workpiece.

HOW ROUTER TOOLS WORK

Cutting Efficiency

Router tools (or bits) are very small, and therefore rely quite heavily on speed to get the job done. High rotational speed is necessary to remove enough waste to allow even moderate feed speeds, compared to larger diameter cutting tools. For example, a spindle moulder running at 3,200rpm with a 150mm diameter cutter will have a peripheral (or rim) speed of 1,507 metres per minute. This is considered an ideal speed to cut timber. A router cutter of 20mm, on the other hand, needs to rotate at 24,000rpm to achieve the same peripheral speed.

Quality Finish

The finish quality of timber products is usually expressed as cuts per 25mm with 8 to 12 marks for joinery, 18 marks for interior work and 24 (minimum) for furniture. If we were to try and achieve one cut per millimetre we would not be far off producing reasonable quality work, which would be further improved by sanding. With a router cutter spinning at 24,000rpm we can expect 24,000 cuts per minute. If we were to multiply a feed speed of five metres per minute by 1,000 to give us millimetres per minute (5,000), and then divide this figure by the 24,000 cuts, we would realise a quality of .2mm per cut, which is equivalent to 125 cuts per 25mm, or over five times the recommended minimum surface

quality for furniture! In industry, however, a feed speed of five metres per minute is considered slow, as some production machines are capable of ten times this figure.

Cutter Design

A router bit can have one, but usually has two tips for cutting. If both tips are ground perfectly the figures stated above can be doubled, but we do not live in a perfect world and chances are that your tooling will be less than perfect, so a single knife finish is all that most woodworkers achieve. Grinding, collet imperfections and bearing deficiencies all contribute to your single knife finish. More knives will do little to improve the quality of your work.

Router cutters can be purchased with a tracer bearing. This will allow you to trim bench tops and mould around the edge of panels and doors with a portable electric router. Cutters without a bearing are used in portable routers for interior work such as slots, mortises, face mouldings, raised panels and tee-slots. Static woodworking router machinery also utilises tools without bearings, and extensive use of jigs makes possible complex external and internal shaping of furniture parts.

Ten or more years ago only hand carving could produce some of the shapes that are now produced with computerised equipment. The new 3D router carver bit allows some very attractive surface carvings with the aid of computer



Carbide Tee router cutter with bearing

designed templates. Router cutters with replaceable tips are now available, and some savings in straight cutters can be made here. The tips are held in place with tiny Allen screws, and are reversible, so they can be used twice.

Router cutters are made with a half inch (12.7mm) shank which fits most hand held electric routers, and quarter inch shanks (for which a collet sleeve is required), for smaller diameter cutters. Always use a half inch shank if possible, as they give more stability and less chatter. A quarter inch shank has only a quarter of the cross-sectional area of a half inch shank, and driving this with anything up to a 3hp motor does not appear to be a sensible thing to do, unless you are only doing light duty work such as surface etching.

Collets

The shank is held in the machine by a collet, and secured by a cap nut. This collet is subject to wear. You can feel the force in a portable router when you turn it on. It tries to twist itself in your hands, and this force is transferred to the cutter shaft. Collets eventually become oval-shaped and

need to be replaced every 1,000 hours or so of operation.

Tool Edges

The cutting edge on a router tool can be *high speed steel*, which initially gives the sharpest edge, but is not relatively long lasting especially when used on abrasive timbers, man made boards or when cutting along glue lines.

Stellite is a metal alloy that is more temperature and wear resistant than high speed steel. Feed speeds can also be increased with stellite tipped tools.

Cemented carbide cutting tools such as *tungsten carbide* are the longest lasting of the 'affordable' cutting tools. These tools are a mixture of tungsten and carbide bonded with cobalt (powdered metals) which are pressed into a form and fused together. They retain their hardness and temperature resistance to 1,400° Fahrenheit.

Diamond tipped router cutters for cutting manufactured boards are now common in industrial applications, where they consistently cut over 200 times longer than tungsten carbide, but for the home workshop cost is prohibitive (around \$500 each).

Cutter Shapes

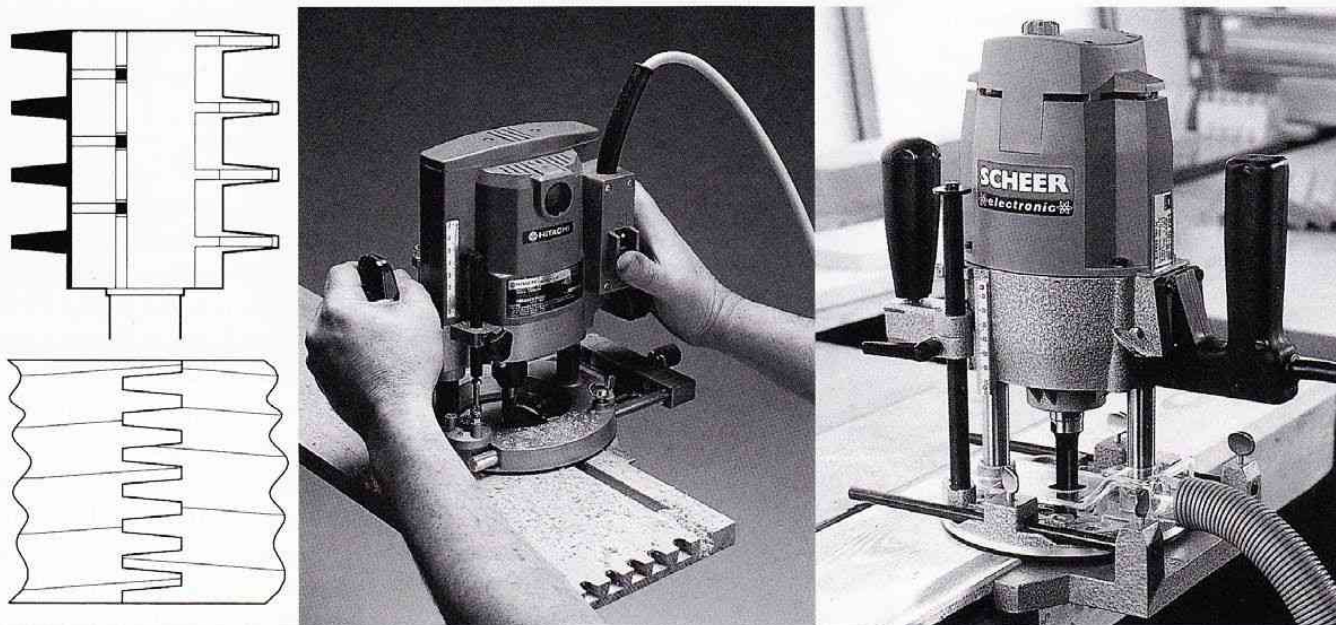
There are literally hundreds of different shaped cutters from which to choose. Rounding over, bullnose, roman ogee, reeding, hand rail, finger joint, cove, regency, classical, mitre lock, tongue and groove, raised panel and stile/rail joining bits from which to select.

USING THE TOOLS

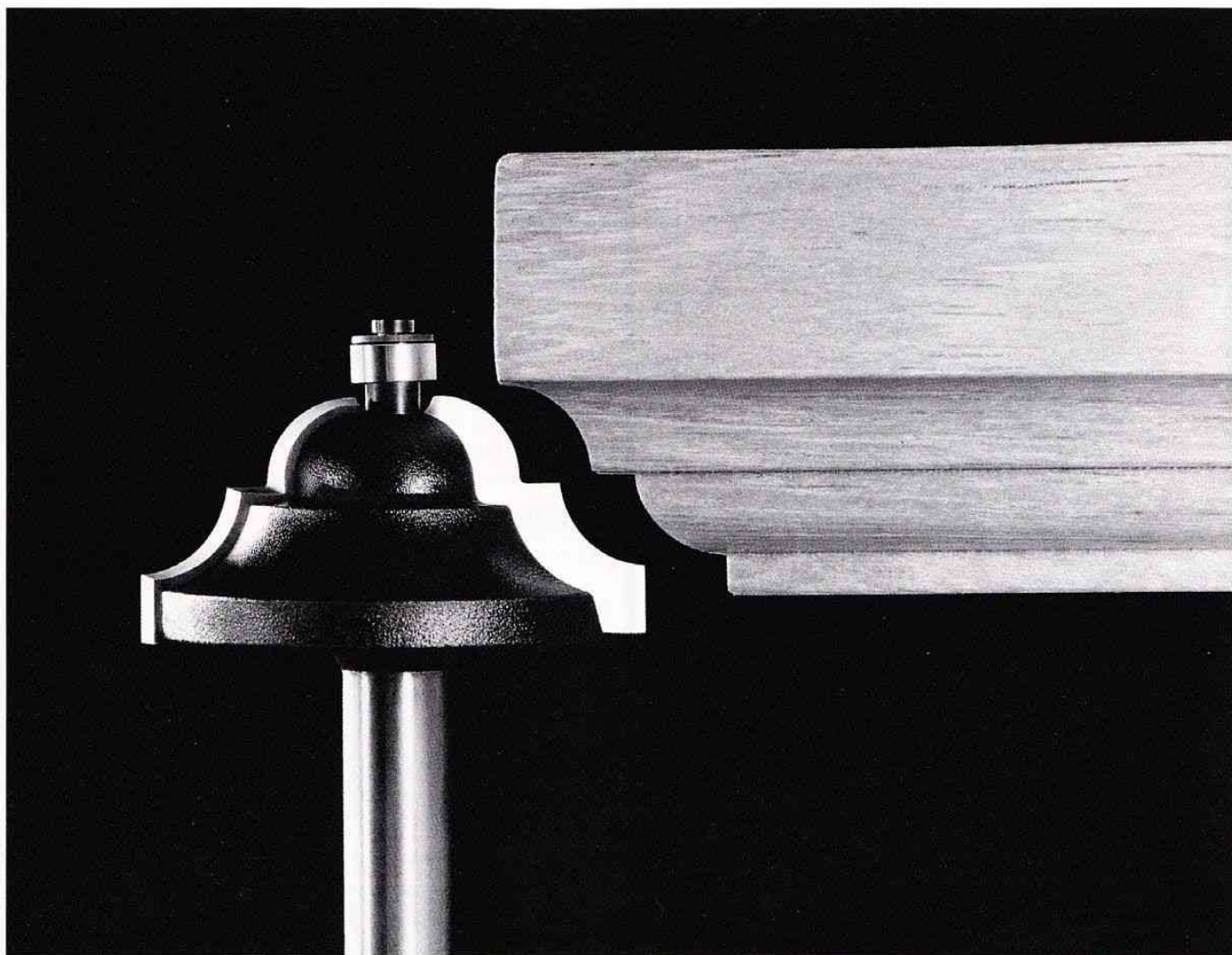
Tool Heat

All cutting tools generate heat, and the high rotational speed of the router cutter generates an enormous amount. Usually this heat is dissipated with the removal of the chips, but if the router tool is fed too slowly, the cutter takes off too little wood with each cut. The resultant action is more like scraping the material and creates friction and heat.

On the other hand, a too high feed speed causes the cutter to take off too much with each cut. With the heel of the cutter rubbing on the wood friction and heat are again the result. In reality, too fast a feed speed is not likely with a hand fed portable router.



Above left: Linbide finger joint cutter. This style of cutter dramatically increases gluing area and thus strength of joints. Designed for end or long grain, ideal for strengthening edge joints such as table tops. Linbide available from David Trembath Agencies. Above centre: Hitachi make a range of routers to suit part-time and the most demanding professional use. The Scheer router (right) is pitched directly at the top end of the professional market and is available from the Woodman Group.



A Leitz cutter and the timber profile it produces.

Feeding Speed

The tip here is not to feed the router through the work too slowly. The router tool already gives a very good finish due to its high rotational speed. You can quite confidently push your router through the work at five or ten metres per minute without any problems. This is about twelve seconds for each metre, which is difficult to maintain by hand feeding. The feed speed will change around corners, or when you get tired, or according to the wood you are working, so in effect your quality will be all over the place. Just try and be as consistent as you can—experience is the best teacher.

Operations

When cutting a rebate, use a cutter with a diameter at least twice the width of the rebate. The larger gullet and a short contact arc will allow waste to escape more easily. Cutter tempera-

tures will also be lower, and feeding also will be easier.

A conventional straight router cutter will have two flutes and should not be used to plunge into the work more than 5mm. Slots or mortises may require a knife that cuts across the entire tool diameter—in certain instances the tool will have to be ordered specially. If it is necessary to machine a mortise with a conventional bit, you should feed the router as you operate the plunge feature, a process called 'ramping', which is performed extensively on CNC equipment.

Remember, a standard router cutter is not designed to remove waste like a drill bit. On shallow cuts this will not present a problem, but on deep plunge cuts the waste gets trapped in the cutter and will heat to high temperatures which can easily cause the wood to catch fire.

Always feed the router against the direction of the rotating tool. This is absolutely essential for your safety. On an external cut this means moving the router in an anti-clockwise direction. When machining the inside of a frame, you will need to move the router in a clockwise direction. If you go the wrong way, the chance of the tool grabbing and pulling the machine out of your hands is about ten times greater, and is clearly dangerous.

Modern tools are now more efficient and have built in safety features that prevent tool grab and kick back. The most obvious difference is that the cutter has more body to it than older tools. This is a result of extensive tests by German woodworking engineers, and the results are now being implemented by tool makers all over the world.



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WA: Power Tools & Mach'ry, 13 Beechboro Rd, Bayswater (09) 272 3844

Tool Maintenance

The router bit is relatively inexpensive compared to other cutting tools, such as saws, shaping-cutter sets and planing tools and because of this it is probably not looked after nearly quite so well.

Keep your router bits sharp. This is not just to keep the tool sharpeners happy, it's just good practice to sharpen your cutters as soon as they need it. Carbide tips deteriorate quickly once they lose their edge. If you keep on using the tool, the carbide particles at the tip will start to pull away, and only a serious regrind will restore its original condition. A router tool has enough carbide to allow up to twenty sharpenings, but prolonged use will mean that more carbide will need to be removed to sharpen the tool properly, and the life of the tool will be shortened.

If your router cutter has a bearing, keep it clean. A light machine oil can be used to maintain its smooth operation. A dirty, clogged bearing will fail, and cause excessive heat.

Handling The Cutters

Carbide tipped tools are very long wearing but brittle—don't drop them. Carbide and diamond tipped cutters are particularly susceptible to shock, and should be handled and stored carefully. It is a good idea to keep the original packaging to store your cutters in, or make a customised tool box. When mounting the cutter into the router, make sure that about 20mm goes into the collet. Failure to do this will result in broken cutters, spindle nose wear and collet bell mouthing. Tighten the cutter securely, but don't over-tighten.

SUMMARY

Router cutter and tooling technology in general is developing all the time. Spiral flutes, alternate shear, chipbreaker profiles and 'smart tools' with micro chips are either near-future technology or seen as necessary to solve today's machining problems of new materials or high recovery value adding applications. In industry, every avenue must be explored. The best advice is to learn as much as you can about the tools you use, and look for the best quality cutters, which in most cases will not be the cheapest.

Suppliers of Router Bits

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Woodman Group (03) 9885 6104, (02) 708 3233,

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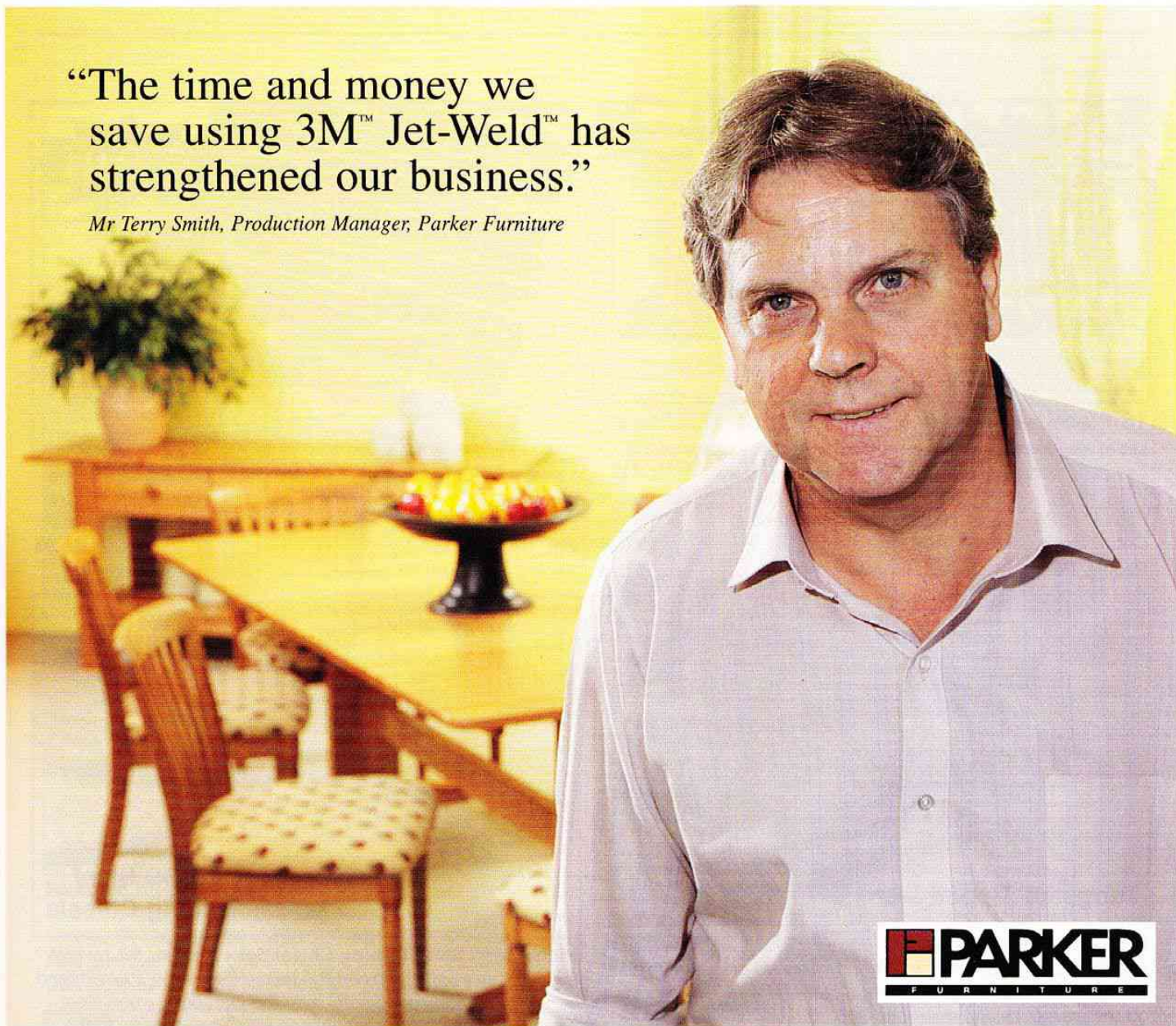
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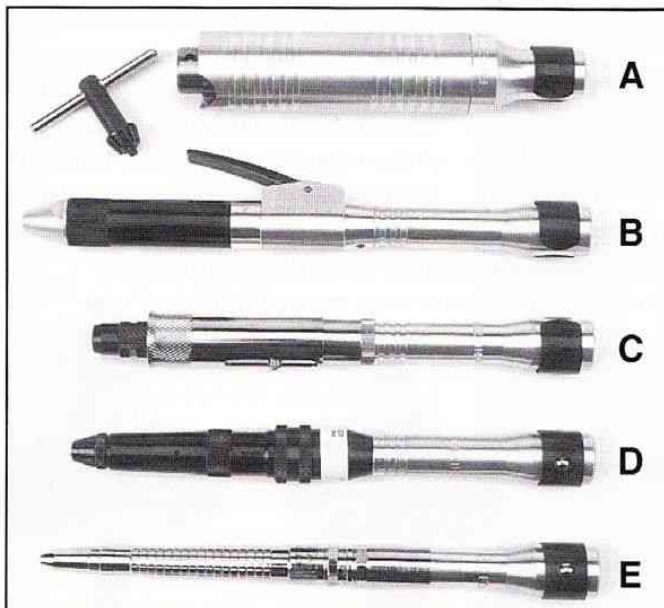


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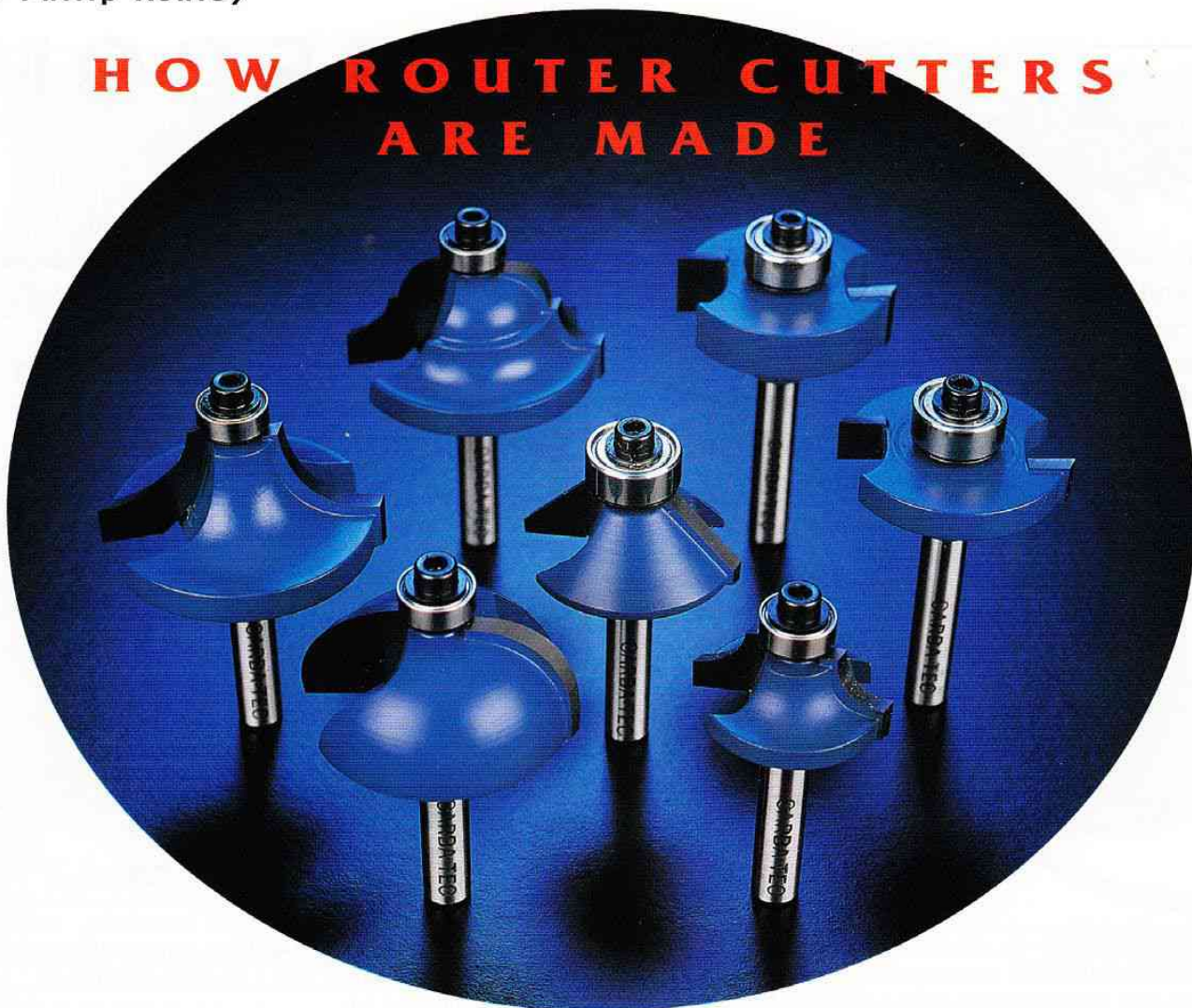
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HOW ROUTER CUTTERS ARE MADE



Buy the best you can afford is a good rule to follow when it comes to buying tools and equipment for wood-working. This rule certainly holds true for router cutters, though for some reason they are generally regarded as being costly items. Compared to other cutting tools they are in fact less

expensive—especially when the enormous stresses under which they operate are considered.

High operating speeds and loads make every aspect of cutter design critical. Router cutters must be absolutely parallel and concentric. Most problems associated with routing operations can be

traced back to the tool itself—quality is paramount.

To see what the cost of a router cutter pays for we visited Carb-I-Tool (Aust) Pty Ltd, located in Moorabbin, Victoria, an Australian quality router tool manufacturer. This company uses Australian steel except in rare cases

Stages in cutter production: 1. Turned from blank 2. Flutes have been milled 3. Tips are brazed on 4. After grinding the cutter is dipped in long lasting black paint 5. Cutter with bearing in place



when overseas materials are sourced. Micro grain size carbides are used to give a keen cutting edge and long wear life. Cutters machined from large blanks exhibit more instances of failure than those made from pre-formed blanks.

Manufacturing router cutters is an exacting process which can be divided into four stages: turning, milling, brazing and grinding.

TURNING

Your router cutter starts out as a three metre long round bar. The steel is either a medium or high tensile steel, depending on the application for which the cutter is intended. This long bar is placed in a CNC (computerised) turning machine which, literally in a minute, turns the basic shape of the tool to an accuracy of 1/1000 of an inch (all dimensions are in inches). The cutter, complete with threaded end for the bearing (if fitted), is then cut off and falls into a collection bin. The shafts of the cutters are left slightly over-size at this point leaving sufficient stock for finish grinding at a later stage.

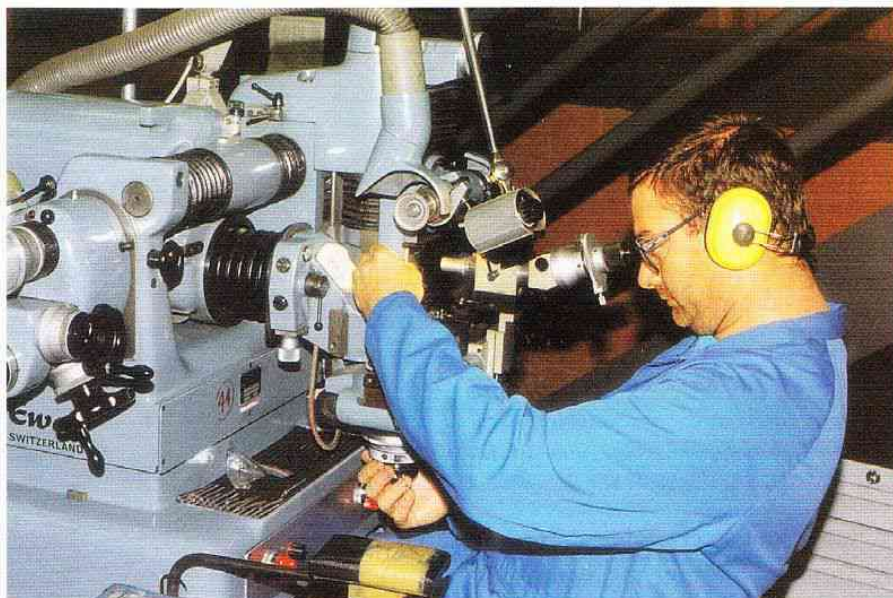
MILLING

At the milling stage, the cutters are mounted into specially modified milling machines where the flutes of the cutters are machined. This is done to a very strict quality standard, as the carbide blanks have been manufactured to fit exactly the milled shape. This stage takes about five minutes.

BRAZING

The next stage is to braze the tips onto the cutter blank. The carbide tips are manufactured locally, and are pressed to the exact size required for every tool in the range. Some of the 700 different router cutters in the catalogue require carbide blanks to be made at a cost of \$2000 to \$2,500 for each individual press tool!

The carbide tips are 'finished' on a diamond wheel to remove any oxides caused by exposure to the atmosphere. This ensures good adhesion to the body of the tool. The cutter body is then



Top: A technician precision grinds solid carbide router cutters at Carb-I-Tool. Centre: Brazing carbide tips onto the router body. Photos: Debbie Butler. Above: Grinding tungsten carbide tips on a CNC machine in a router manufacturing plant in Taiwan. Photo courtesy Carba-Tec.

dipped in flux. The surfaces to be brazed are fluxed, which stops oxidation during the brazing operation—this guarantees good adhesion.

Before attaching the carbide tips to the body of the tool, the cutter is first placed in an induction coil. Here electricity creates an electro-magnetic field around the cutter, heating it quickly to a high temperature. The carbide tip is also heated, and when the tool body is removed from the induction coil, a 45% silver solder is applied to the tool and the tip pressed into place.

At this point the technician moves the tip from side to side to make sure there are no air pockets under the carbide tip. Because the tip has been manufactured exactly to fit the machined flute of the cutter, the result is always a very neat fit. This part of the operation is done by hand, as an automatic tip applicator cannot guarantee that no air pockets are present.

Some larger cutters are soldered with a 'trifoil' sandwich. This is a 10/1000 inch copper strip placed between two silver solder strips. The copper acts as a dampener, and prevents the large carbide tips from cracking as they cool down at a different rate to the body of the cutter.

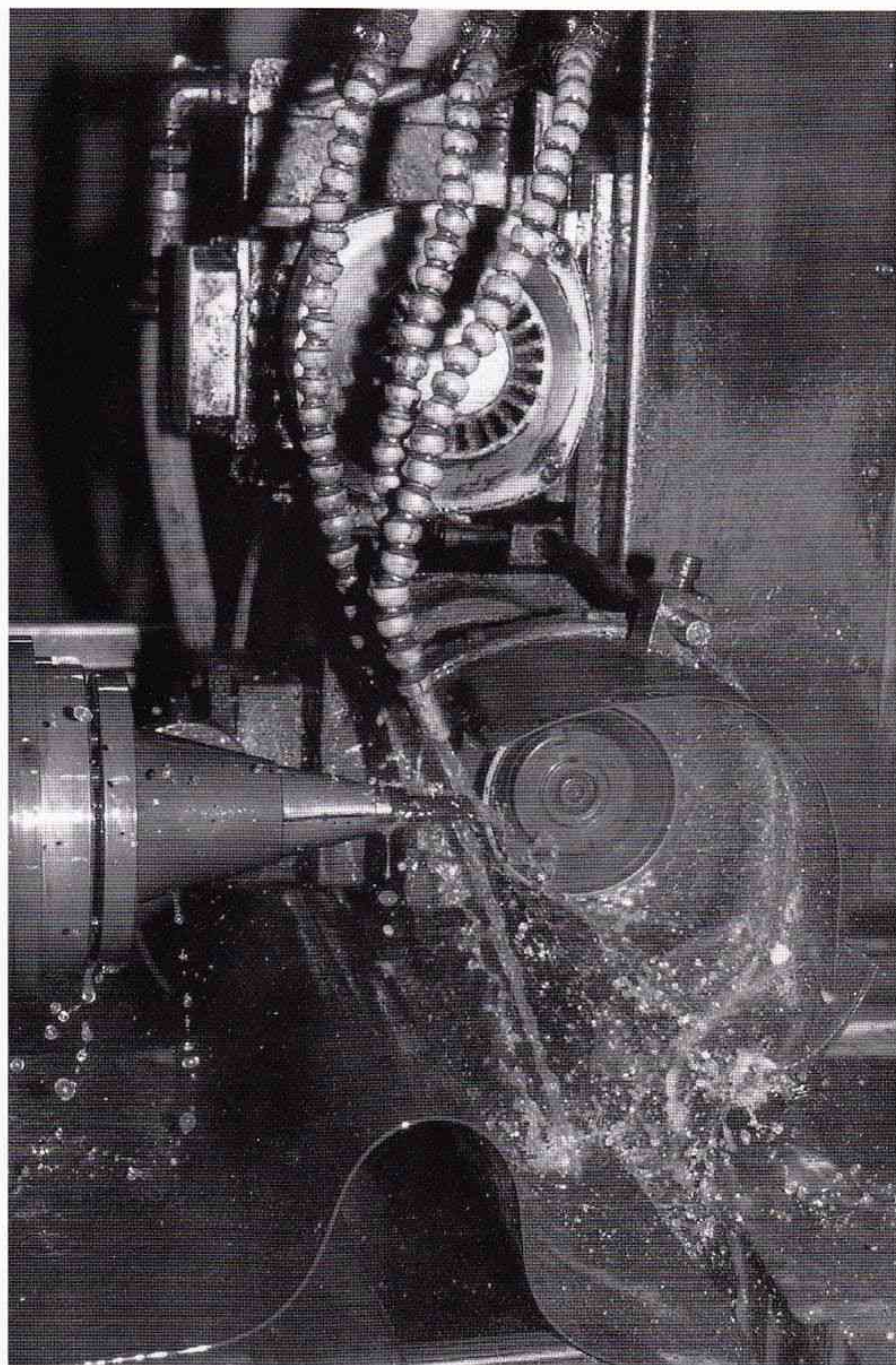
After the cutter has cooled it is dipped in a hot water cleansing fluid, sand-blasted to remove solder spillage, and then dipped into a long lasting black paint.

GRINDING

Both tool and cutter are then ground. The heel of the carbide tip is ground first, then the face of the tip is finished. For some of the tools in the range, the final grinding process is done on one of four Australian-made 'Anca' Fastgrind machines. At over \$250,000 each, these represent an enormous investment in quality. Accuracy is here in the region of 1/1000 inch.

TESTING

The cutters are now tested for runout (concentricity), diameter, clearance, size and overall appearance before being



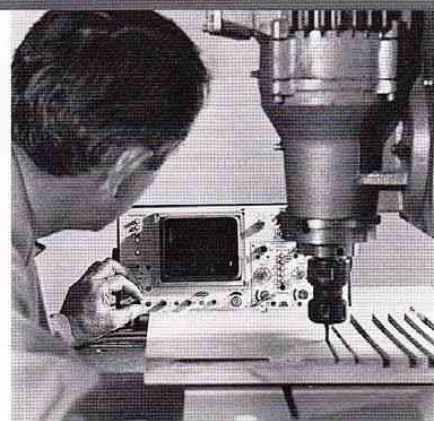
Above: Final grinding is done on a 'Anca' Fastgrind CNC tool and cutter grinder which is worth around \$250,000.

Below: Testing a router bit to determine cutting forces exerted on the tool. The equipment shown is capable of 0-100,000rpm on 0-100 metres per minute of feed speed. Tools are often tested to destruction. Photo: Leitz.

packaged.

A poorly made tool will not give even 10% of the performance of a quality tool. The benefits of good quality tooling are top results and long term savings—even if you have to pay more to start with.

Special thanks to Carb-I-Tool (Aust) Pty Ltd for assistance with this story.



LEIGH® DOVETAIL JIGS

D4 DOVETAIL JIG



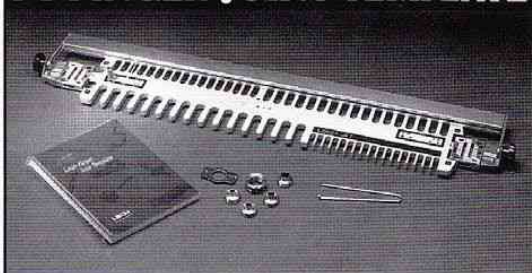
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"Not only does this jig provide for a high level of flexibility of size, proportion and layout, the result is a joint which has all the appearance of the finest handmade joints. The jig offers the best of all worlds—all the characteristics of the traditional craftsman-made joint, flexibility of layout, perfect fit every time, accurate reproduction as often as required and very high speed of working."

Gordon Warr—*Practical Woodworking*

Item D4-24—24" Leigh Dovetail Jig. Includes cutters Nos. 80 and 140, a comprehensive User Guide, angled sidestop and screwdriver.

F1 FINGER JOINT TEMPLATE



The F1 Finger Joint Template. Incredible precision and versatility.

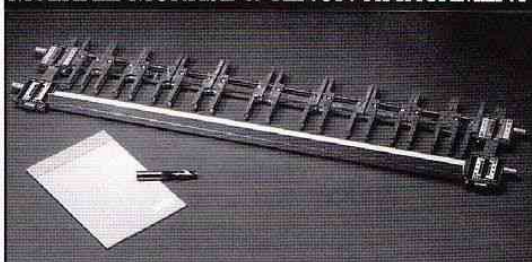
Precision CNC machined aluminium alloy template.

Easy to read scales, state-of-the-art instruction manual with extremely simple step-by-step instructions.

The F1 fits directly to jig models D4-24, D3-24, D1258R-24 and D1258-24.

Item F1-24—24" Finger Joint Template. Includes eight-piece variable guidebush system and User Guide.

MULTIPLE MORTISE & TENON ATTACHMENT



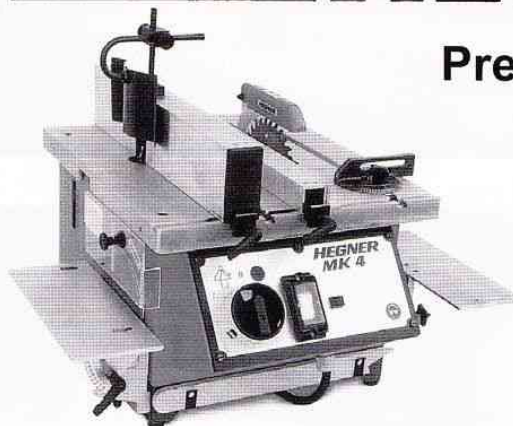
Multiple mortise & tenon joints are preferred by master furniture builders as the strongest, most attractive way to join shelves or partitions to a carcass.

Now the Leigh MMT attachment makes it easy for you to cut these solid, elegant joints in virtually any layout you can imagine.

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Item MMTA-24—24" Multiple Mortise & Tenon Attachment. Includes cutter No. 180 and User Guide.

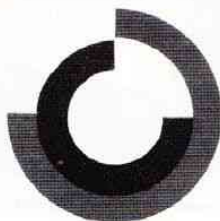
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MACHINING DOWEL JOINTS

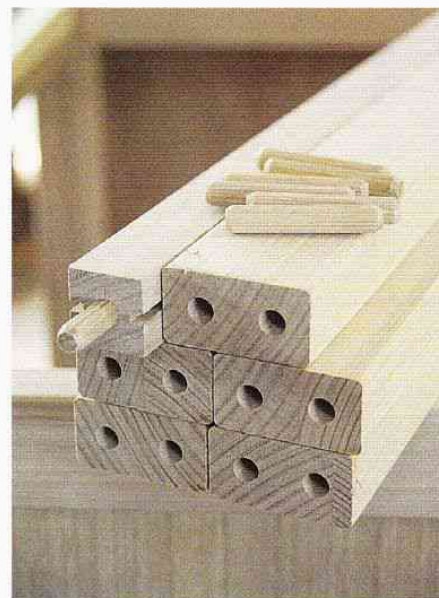
A dowel joint is a reasonably strong method of joining two pieces of wood, provided some simple steps are adhered to.

The dowel joint is one of the most used joints in the small workshop, and one of the simplest to machine. Dowels are readily available from the local hardware store in small packets, or in quantity from cabinetmakers suppliers. They come in a variety of standard sizes in lengths from around 30mm to 70mm and usual diameters of 6, 8, 9.5, 11 and 13mm. Imperial sized dowels can sometimes be bought in 1/4", 3/8" and 1/2" sizes. Dowels are commonly made from Victorian or Tasmanian ash, European or New Zealand beech and Malaysian ramin.

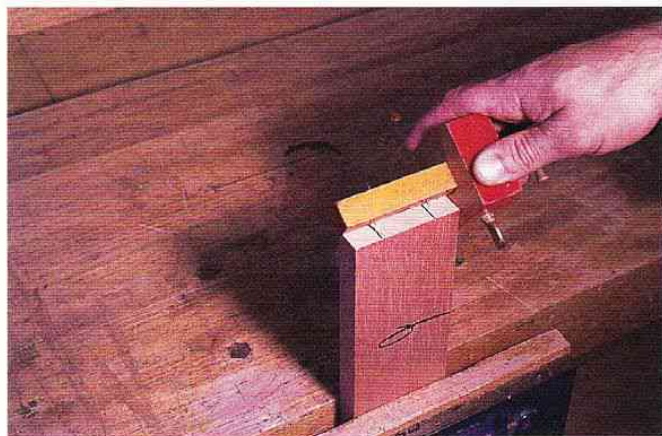
The size of the material to be joined will determine the dowel size you need. The dowel should be one third to half

the thickness of the timber, and the length should be six times its diameter. Therefore, if the material is 20mm thick and the chosen dowel is 10mm in diameter, the dowel should be 60mm long. Always use fluted dowels (they hold better) and do not 'wipe' the glue from the dowel hole when they are inserted.

For edge jointing boards, dowels are used only to locate the pieces level while the glue dries. Place dowels fairly close to the ends, and space the others regularly along the length, making sure that they penetrate each piece equally. Mark the faces of both pieces. Place these face down on the table while drilling on a horizontal borer



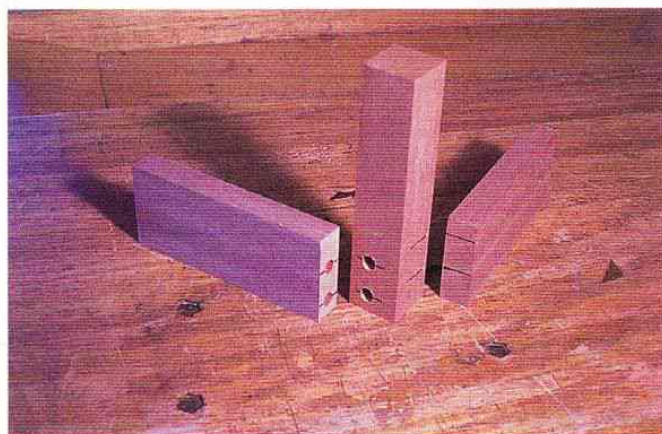
Drilled pieces ready to receive dowels.



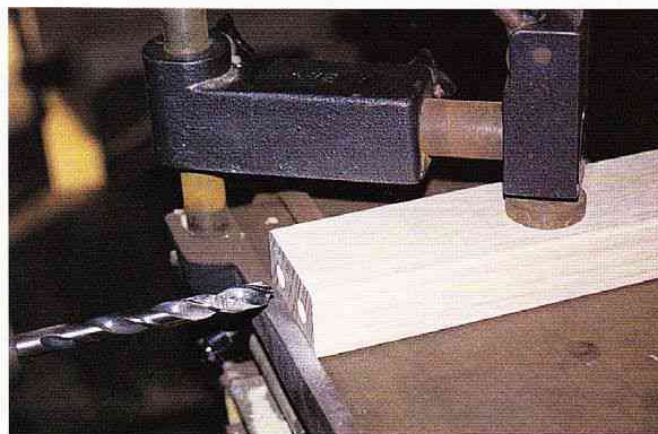
Marking the rail.



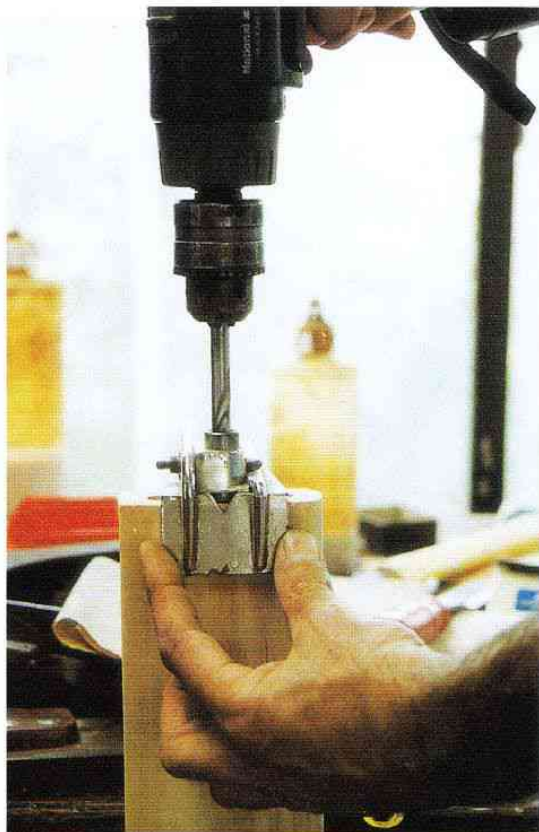
Marking the leg.



Leg and rails ready to assemble.



Drilling on a dowelling or mortising table.



Using a portable jig for drilling.

so that you index from the same face. In this way the faces will be flush when the joint is assembled.

Dowels are ideal for joining door or furniture end frames to strengthen butt joints. The bond strength of an end grain rail joined to the side of a stile is only 25% that of an edge glued joint. Dowel proportions should remain the same, but more of the dowel should be inserted into the stile than the rail. This is because the grain of the stile and dowel are opposing, which results in a weaker join. There is no rule of thumb here, but generally I bore the holes in stiles as deep as I can.

Space the dowels across the width of the rail so that there is not less than 5mm between the dowel and the edge of the piece (this can vary of course with large dowels). On a rail of 45mm width, I use 9.5 to 10mm dowels and drill the centres 10mm in from either edge of the rail, and in the centre of the thickness.

Use a sharp dowel boring bit. A normal twist drill is very hard to control and will not last as long. Dowelling bits have brad points for drilling into

wood. Make sure you select the right drill for the dowel. The actual drilling must be straight and accurate; drilling tables or jigs make the job easier. I use a dowelling table which is really just a rise and fall table mounted with a motor and chuck. Small lightweight dowelling jigs can also be used which, with care, will give good results.

Don't leave too much space in the bottom of the holes for the glue. You can now buy glue in regulated doses which comes in small plastic pellets. These are inserted into the hole, followed by the dowel. This method is supposed to give a metered dose of glue, but if the hole is too deep

you may not even burst the pellet, hence no glue.

The two pieces you are joining will exhibit quite different movement characteristics under different conditions. This is due to the grain alignment of the two pieces. In the case of severe movement the dowel joint will fail and open up, and here the glue used will determine how bad the failure will be. PVA or white glue is satisfactory in most circumstances, but for a better hold use a phenol or melamine formaldehyde glue—remember though that these glues leave a dark glue line.

If the work is done properly there will be no need for a trial fit, but if this is necessary you should use sanded dowels for the test, as the vacuum formed by ramming home the dowel will make it impossible to withdraw the dowel without damaging it. Timbers which tend to split easily can be supported with a G-cramp on the faces whilst gluing up—and lastly, don't forget to wipe the excess glue away.

Dowelling drill bit suppliers:

Carba-Tec: 1-800-658 111

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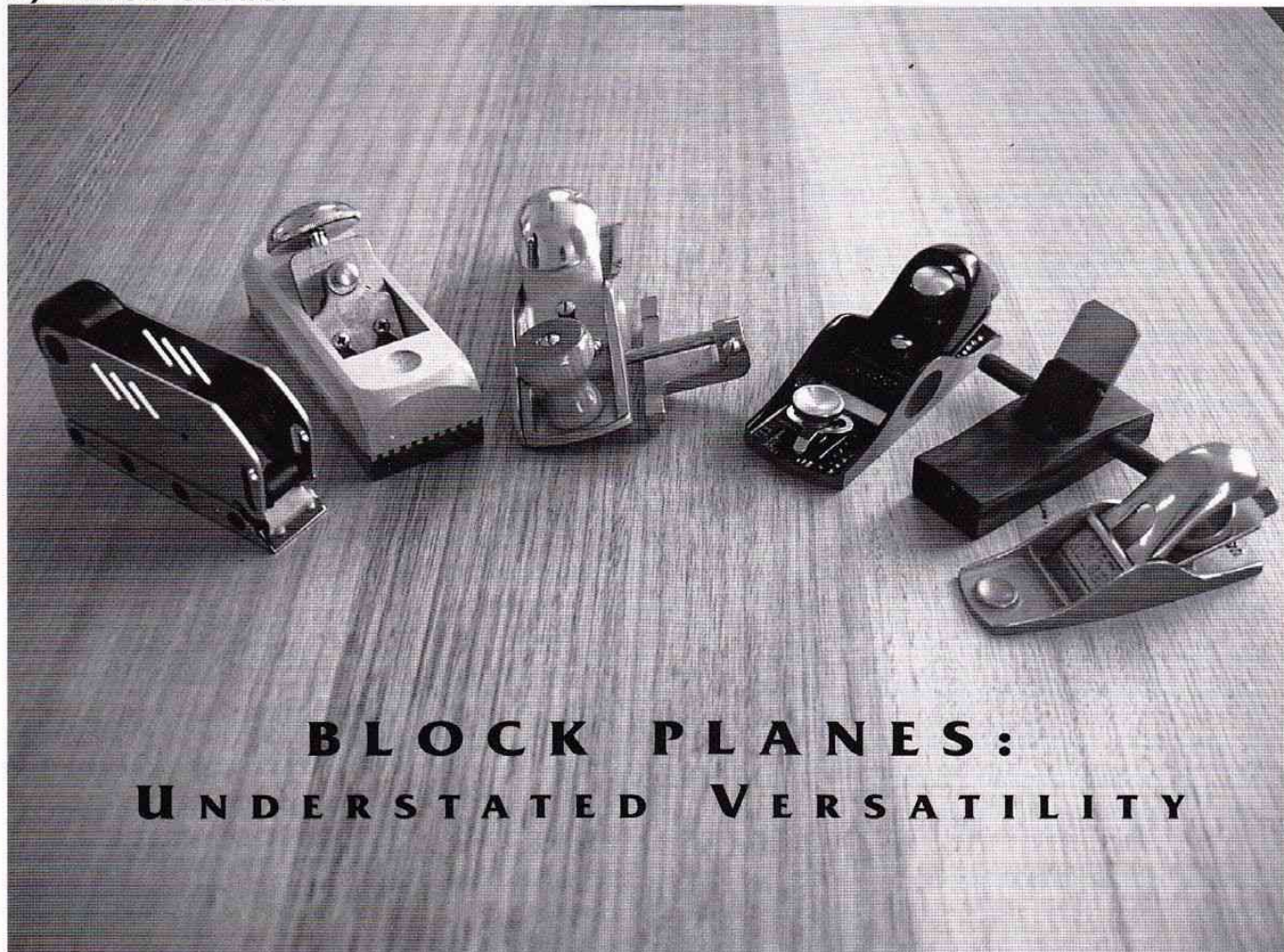
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BLOCK PLANES: UNDERSTATED VERSATILITY

Although hand planes are found in every workshop and are *the* essential woodworking tool, one type of plane that is often overlooked is the block plane.

Block planes vary in length from 75-175mm. The size of this very versatile tool allows it to be held in one hand for great control during precision trimming, chamfering, shaping (even on curves) and small planing jobs.

The area where the block plane really excels though, is the planing of end grain. With a sharp blade, the low angle cutting action actually shears the end grain fibres and produces a mirror finish that no other plane can. Block planes are also highly effective on man-made materials such as plywood, MDF and even laminates.

Because block planes don't have a chip breaker, sharpening and set up is fast and easy. In a block plane the blade is installed with the bevel facing up, unlike standard bench planes.

Having the flat side of the blade facing down allows for a much lower angle and for the blade to be supported from underneath, very close to the cutting edge. This helps to reduce chatter and enables a very fine cut to be made without tearout. With no chip breaker the shavings actually roll up against the ground bevel of your blade.

BLADE ANGLES

Standard block planes have a blade angle of around 20°, while low-angle block planes have a blade angle as low as 12°. The actual cutting angle depends on how steep you grind the bevel on the blade. On normal bench planes the cutting angle is fixed. On a block plane, where the bevel on the blade faces up, you can actually change the cutting angle by grinding the bevel to the angle you want. For general work 25° is used, which gives a cutting angle of 55°.

TYPES

Most block planes are relatively simple. Bodies are available in various lengths and are made from either steel, bronze or wood. Adjusting mechanisms vary somewhat, but most offer a knob located behind and below the rear of the blade which screws into the base at an angle the same as the blade.

This mechanism usually has a point or pin which contacts a small slot in the blade and this in turn moves the blade up and down. Generally block plane adjusting mechanisms are quite good and hold the blade well at the desired depth of cut.

The more sophisticated block planes also have features such as adjustable throats and removable sides for rebating. Although I question the value of such features, they are often sought after by the professional woodworker.

There are many types of block planes on the market and your choice will, to

a large extent, be dictated by your budget. Prices range from \$80 to \$260 depending on make and model.

Most blades and adjusting mechanisms work relatively well, so my advice is to select the plane that you feel is most comfortable to hold in one hand. It is then up to you to sharpen and tune it to work to your standards.

TUNE UP

For your block plane to perform to its maximum potential it must be tuned and set up properly. When you purchase a new block plane, check the sole with a quality straight edge to make sure it is really flat. You can even take your straight edge to the shop with you to find a plane you are happy with. If the sole has very minor imperfections you can use some wet and dry paper on a really flat surface (such as a ground machine table) to accurately remove them.

Ensure the blade seats properly in the plane and the adjusting mechanism works smoothly with no slack. I also like to file and sand with fine wet and dry sandpaper any burrs or rough edges on the casting that may make the plane uncomfortable to hold. I always tune my tools straight after purchase. You know you can then begin using your plane when a job comes to hand, and for many years to come.

TIPS

Always keep your plane very sharp, especially if you are working on end grain or figured timber. I often find by skewing the plane and changing the direction of cut, even along one length of timber, tear out is greatly reduced on such timbers.

I find I use block planes all the time for quick jobs such as chamfering. I also often use them in place of a spoke shave for shaping and planing curves, as I find block planes offer a much quicker cut and, because of the sole length, greater control.

I have five block planes which are all set up slightly differently and are used for different tasks. I also find it helpful to have several spare blades, which

are sharp and on hand to change during a large planing job where you don't want to stop for sharpening.

BLADES

The blades supplied are generally quite good, but often require some work to get the back really flat. This can be achieved quite quickly on a 1000 grit Japanese water stone. I have found the Lie Nielsen blades to be the flat-test and to hold the best edge. As they are about 3mm thick and are precision ground on all faces, sharpening is very easy.

Specialty blades are also available to suit a number of block planes. These blades are made from superior quality steel and hold an edge much longer than off the shelf blades. Being slightly thicker than the standard blade, they are heavier, a feature which helps to reduce blade chatter.

THE TEST

Six block planes were supplied for testing and review for this article. I sharpened each plane blade (except for the Rali whose disposable blades come sharpened), on a 1000 grit and then 6000 grit Japanese water stone. I then tested out the planes on a range of timbers ranging from soft huon pine to hard blackwood and then the hardest timber I could find—gidgee.

All planes performed very well with the only real difference being blade quality, weight, and overall feel. The specifications for each plane can be found overleaf.

CONCLUSIONS

The two Lie-Nielsen planes (which are remakes of original Stanley designs) easily had the best overall finish. They came well finished straight from the box and ready for use.

Of the two wooden sole planes tested, HNT Gordon's Palm Smoothing plane had the superior finish. It was hand finished and lightly coated in linseed oil. I found the ECE to be poorly sanded and unnecessarily coated in thick lacquer.

For value for money the HNT Gordon

plane was the clear winner. It came with the most detailed instructions, covering all aspects of the plane from set up and sharpening through to care and use. It was also ready to use straight from the box, the blade being already honed. This plane also doubles as a scraper plane by reversing the blade and for woodworkers who want to plane highly figured timbers, I would recommend this as the best choice.

For planing end grain Lie Nielsen's low angle skew block plane performed like no other. Although I found it to be a little bulky and awkward to hold, the skew action of this plane produced a mirror finish on endgrain by virtue of its smooth planing action.

The less conventional plane from Rali uses disposable blades which although sharp and reversible, I found to be somewhat lightweight. The Rali plane worked surprisingly well and would well suit on-site work.

Record's 0601/2 felt to be just the right weight in the hand. This is the only plane tested which had an adjustable throat, a feature some feel reduces tearout, although I personally haven't really observed this. The Record plane required minimal tuning and, after the blade had been sharpened, was ready to go.

Overall I would recommend one of the two Lie Nielsen planes, with the small standard block plane being the easiest to hold and use. Because of the price, these Lie-Nielsen planes are only likely to appeal to the professional woodworker, but for long term use I believe they offer the best value for money.

Overleaf is a comparison of the six planes tested.

Planes supplied for this review by:
Garrett Wade Australia (H.N.T. Gordon and Lie Nielsen)

tel: 1-800-33 77 36

Record Hand & Power Tools (Record):
tel: (02) 748 6800

Carba-Tec (Rali) tel: 1-800-658 111
Prices quoted overleaf were current at time of writing.

RECORD 060 1/2

Made in UK

Cost: \$79—\$95

Size: 160mm long, 50mm wide.

Adjustable throat: Yes. Very accurately machined.

Body: Cast iron.

Blade: 2mm thick, flat.

Blade angle: 12.5°

Blade width: 41mm

Packaging: Cardboard box with set up and Record product information.

Overall finish: Not bad, but all edges were rather sharp.

Adjusting Mechanism: Solid brass adjusting knob. Unacceptable slack in blade adjusting mechanism.

Comments: This plane had a good overall weight. Some work required to tune it up properly. The plane comes straight from the box covered in oil, which takes some time to clean off (better than the plane rusting though).



H.N.T. GORDON PALM SMOOTHING PLANE

Made in Australia

Cost: \$95

Size: 120mm long, 38mm wide

Adjustable throat: No

Body: Australian red ebony (red ironwood).

Blade: 3mm thick, 18% tungsten HSS

Blade angle: 60°

Blade width: 30mm

Packaging: Cardboard box, with illustrations and clear, detailed instructions.

Overall finish: Very good.

Adjusting Mechanism: None.

Blade held by wedge.

Comments: Great alternative to other planes on the market. Excellent for figured timbers. Easy to use once set up is understood.



RALI B30

Made in Switzerland

Cost: \$118.86

Size: 125mm x 30mm

Adjustable throat: No

Body: Fabricated steel

Blade: Disposable and reversible blade

Blade angle: 47°

Blade width: 30mm surgical steel.

Packaging: Cardboard, with Rali product catalogue

Overall finish: Good

Adjusting Mechanism: Cam action

Comments: Light to handle.

Although this plane is somewhat uncomfortable to hold it worked well straight from the box. No blade sharpening needed.



ECE ADJUSTABLE BLOCK PLANE

Made in Germany

Cost: \$142.90

Size: 150 mm long 55 mm wide.

Adjustable throat: No

Body: Hornbeam, with lignum vitae sole.

Blade: 2.5 mm thick quite good quality.

Blade angle: approx. 50°

Blade width: 38 mm

Packaging: Cardboard, clear plastic front, comes with instructions.

Overall finish: Not great.

Body finished with thick lacquer with deep sanding scratches.

Adjusting Mechanism: Positive blade adjustment.

Comments: Somewhat awkward to hold. Sole was not flat.



LIE-NIELSEN LOW ANGLE SKEW

Made in USA

Cost: \$147.70

Size: 170 mm long 50 mm wide

Adjustable throat: No

Body: Cast bronze.

Blade: 3mm thick, excellent steel.

Well machined & flat.

Blade angle: 12°

Blade width: 38mm

Packaging: Cardboard, with information sheet.

Overall finish: Extremely well finished

Adjusting Mechanism: Excellent, no slack at all and very accurate

Comments: Removable guide fence side allows for rebating. The front knob in cherry could be a better shape. This plane is quite heavy for a block plane and is easier to hold with two hands.



LIE-NIELSEN BLOCK PLANE (STANDARD)

Made in USA

Cost: \$147.70

Size: 130 mm long 42 mm wide

Adjustable throat: No

Body: Cast bronze.

Blade: 3 mm thick, very good quality steel.

Blade angle: 20°

Blade width: 38mm

Packaging: Cardboard, with information sheet.

Overall finish: Very good.

Adjusting Mechanism: Positive and accurate adjustment.

Comments: Two versions of this plane are available. The one tested here is the standard one. A lower angle one is available (blade angle of 12.5°) which I think is the best block plane on the market.



By Philip Ashley
& James Brook

AWISA '96



Every alternate year the Australian Woodworking Industry Suppliers Association hold the AWISA fair at Sydney's Darling Harbour. Established on the international trade fair calendar, AWISA is now the place to be in July, 1996—if you want to stay abreast of what's new and important.

At the time of the last AWISA in 1994, Australia was coming out of a recession and the Government had introduced an investment allowance which made the purchase of machinery very attractive. The current industry climate is on a downturn due to the poor showing of the housing industry. Interest in software continues, and the trend towards computerisation goes on, with Australia leading the world in the per capita use of new technology equipment. The Aussie dollar however, is currently on a high, and machinery from Europe is between 5 and 13% cheaper than it was six months ago—that's definitely an incentive to buy. Add to this is the fact that 15 years ago a CNC router would cost you around \$350,000 at least—today you can get

something from \$90,000 to \$190,000. New technology can definitely become more affordable.

Do you need to go?

The benefits of being able to see the latest technology all in the one place are evident. Where else can you compare over twenty different sliding table panel saws? Even big ticket items like point to point machines, giant edgebanders, CNC routers and beam saws will be there in force.

There is little doubt that success will come to those that plan well, and make the right decisions in terms of manufacturing techniques, based on high output, multi-purpose machinery, modern materials and the right tooling.

Almost all suppliers will have the very latest that their company can

provide which in some cases amounts to millions of dollars worth of equipment and materials. Many will have visiting technical people from machine manufacturers in Europe, America and Asia. High tech machines no longer come as standard 'off the shelf' items, and almost invariably can and should be customised for their intended use.

Being able to compare prices from different suppliers at the one time is also a great advantage. While many suppliers are already operating on pretty fine margins, the prices at AWISA are usually better than at other times. Even if you don't make a purchase, try to get a firm price for your future order.

So what will be the big sellers this year?

Quick set up, multi-tooled machining

centres are a short cut to profit. A large bedroom furniture manufacturer I recently visited has just purchased two point to point machines, and by using innovative machining techniques are now able to produce multiple components in solid timber in only a few minutes. The parts come off the machine ready for the wide belt sander, then immediate assembly and finishing. In the past this work was done on four machines. If used correctly the new machinery, will pay for itself very quickly indeed. A CMS router or similar could well replace four spindle moulders, handling all existing manufacturing as well as opening up possibilities for new types of machining work.

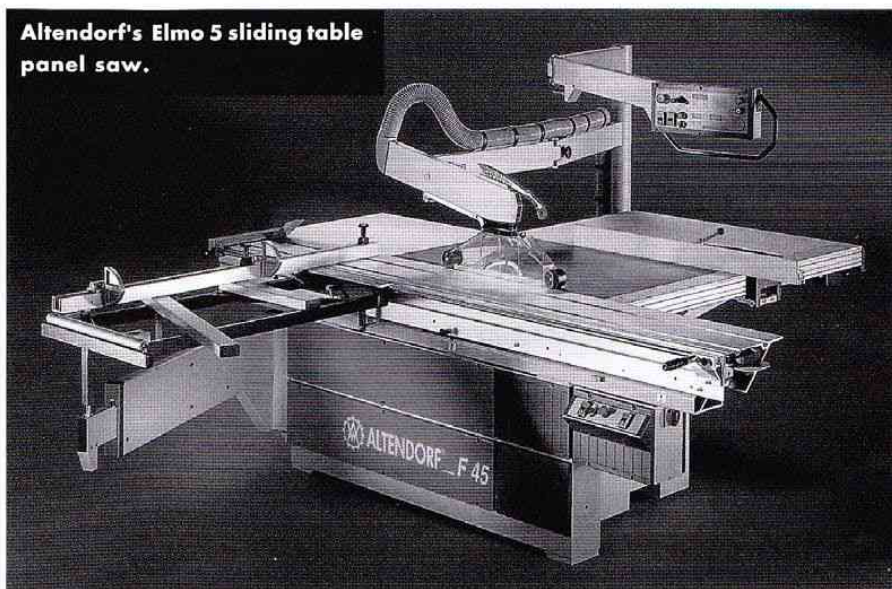
Straightforward panel sizing is another area that can be improved dramatically with newer machinery. A quality beam saw can raise output from between 50 and 400% depending on saw capacity, and because the operator is distanced from the actual cutting process the machine can be safer.

Can You Afford A New Machine

Take a look at what you are making, how you are making it and what your bottlenecks are. As an example, Giben have a standard set of parameters which they use in regard to potential beam saw purchasers. Say you are running two panel saws which cost \$15,000 each. Lease payments on these would be around \$750 per month. On average you would expect 21 working days per month, which results in a cost of \$36 per day. Add on the cost of two operators (at \$280 per day per person including overheads) and this gives you a cost to run two panel saws of \$596 per day. One beam saw at say, \$100,000 (cost only) requires one operator and the same arithmetic produces an operating cost of around \$400 per day. Add to this the improved productivity and ease of repeatability, and a new beam saw in your factory is starting to look like a definite possibility.

Of course, a beam saw cannot cut angles, and so a sliding table panel saw is still a key machine. Altendorf, Felder and the Woodman Group, all reputable

Altendorf's Elmo 5 sliding table panel saw.



Felder's new AD7 51 planer thicknesser

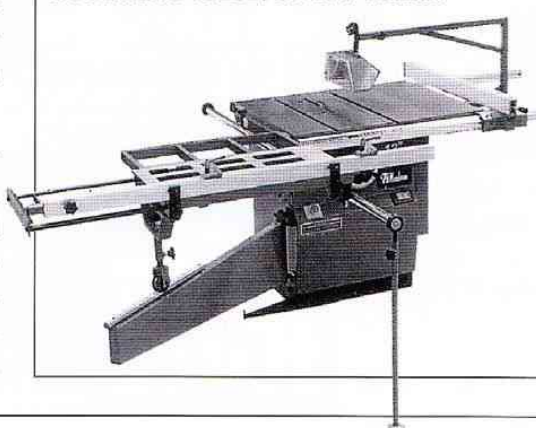
companies, will have their various panel saws on display, and some plan on selling at least twenty machines at the show. The saws are different so take your time weighing up features, costs, warranties and suitability for your own requirements. To help your comparison, Altendorf will run a time and motion study on their own standard and CNC equipment, also remember that for a single operator a new saw without any labour cost is a small \$18 per day.

Felder will show a new planer thicknesser, the AD7 51 which has a 510mm width and bed length of 2080 extendable to 4080mm. The machine comes with a 4 knife cutterblock, self-aligning planer blades, two speeds



Leitz's Vari Plan.

Woodman's TS222/ST saw bench.



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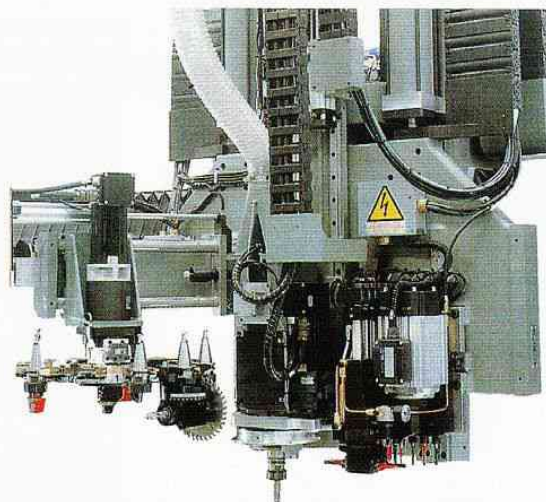
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CMS Automatic Tool Changing Heads TCU+GF offer uninterrupted machining. While drilling it is possible to automatically change the tool on the milling unit. The working unit has a twelve position tool-holder magazine and can be equipped with a fourth axis for controlling the revolution throughout 360° in the X and Y planes. From Giben Australia.

and a big 5.5kw of power. Options include motorised height adjustment and infinitely variable feed speed.

Tooling is often underrated. More efficient tooling, whilst often more expensive, will usually return a machining cost per metre far lower than conventional tools. Better tooling means components need less sanding, parts fit together better, and the design can often be improved. All of a sudden the labour and production costs come down and you can return those savings into that new machine you always knew you needed.

Two of the newest concepts in tooling technology come from Leitz Tooling Systems and are aimed at fast tool set-up and elimination of machine re-adjustment. Profix is for the machining of profiles in solid timber, MDF or particleboard panels and plastics. Knives can be sharpened about 20 times and maintain their exact cutting circle, profile geometry and reference height. Tool holders are available for CNC spindle and through feed moulders.

VariPlan is a planer head with a turnblade knife system. The knives can be face ground four to six times providing two useable cutting edges after sharpening. Knife changing takes seconds—whilst the head is still in the machine.

Training and technical back-up are very important for any machine. The best approach is to spend whatever it takes to get the right machine from a company which offers quality back up service. Good Australian suppliers will usually include on-site training for complex items such as machining centres, but this is generally only for a few days. You should allow for additional training which may occur at the overseas factory. Companies like Altendorf even have an *Altlink* club as part of their service supplying owners with such things as regular newsletters and training sessions.

Software is a must item for manufacturers. Often the only way to increase production is to get it to the machine quicker. An example is the Kreate package, which is a 3D design software product which flows directly from design to CNC equipment such as routers and point to points as well as all popular panel optimisers. This package is used widely for the design and manufacture of office, kitchen and custom furniture. One feature worth checking out is the way Autocad's solid modelling engine is utilised to 'prototype' designs. Parts can be connected together and holes lined up to verify an exact fit—all this on screen, before you even pick up a panel.

Whilst some dealers specialise in particular machines such as E.J.Groth's Taylor clamp gluing system, others such as the Woodman Group are large enough to cover virtually the whole range of woodworking equipment, from sanders, saws, planers and combinations through to cutters, sanding belts, accessories and specialist machines. There's plenty to see.

AWISA is not for hobbyists, it is an industry focused event that is not to be missed by any serious manufacturer of anything made from wood.

Who to look for:

Felder Machinery—Saws, combinations, planers

(03) 9801 7728

Giben Australia—CMS routers, Giben beam saws (08) 346 4884

EJ Groth—Rediclamp & Taylor systems (08) 346 8211

Leitz Tooling Systems—Cutting tools (03) 720 8733

Woodman Group—All machinery (03) 9885 6104, (02) 708 3233, (07) 3844 4433, (08) 346 4561, (09) 272 3844

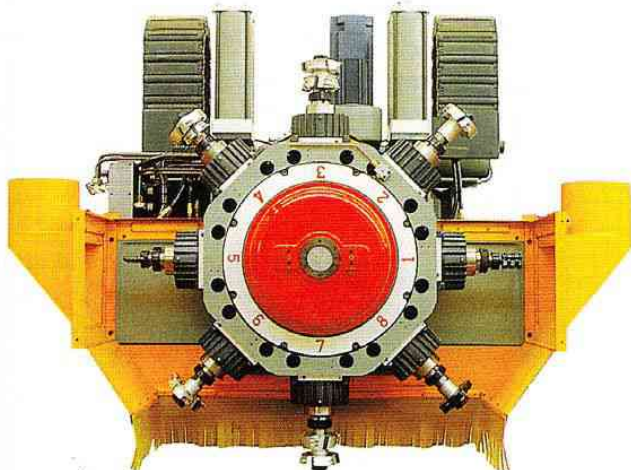
3M—Adhesives, see new Jet-Weld system (03) 381 0000

Key Joining—Hoffmann joining machines (02) 773 3045

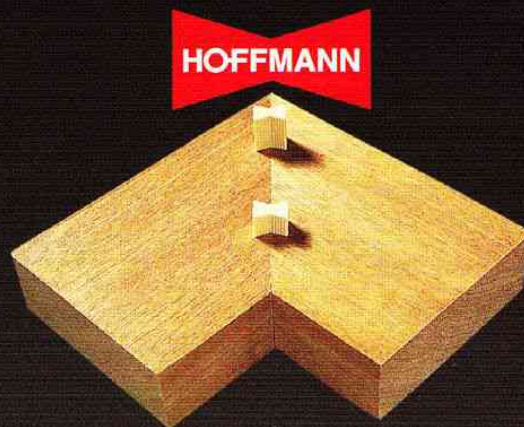
Altendorf—Panel saws (02) 68 3203

Cabmaker—Kreate, software (02) 9901 3664

Record Hand & Power Tools—Hand and power tools, equipment, lathes (02) 748 6800



The CMS Revolver 'R8' tool-changer is a rotating drum with 8 faces, each equipped with an electrospindle.



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WA: Power Tools & Machinery Sales Tel (09) 272 3844 Fax (09) 272 8959

SA: Keith Rudkin P/L Keith Rudkin Tel (0419) 373 444 Fax (08) 373 4496

TAS: Southern Architectural Hardware John Saunders Tel (002) 280 941

THE COLLECTORS

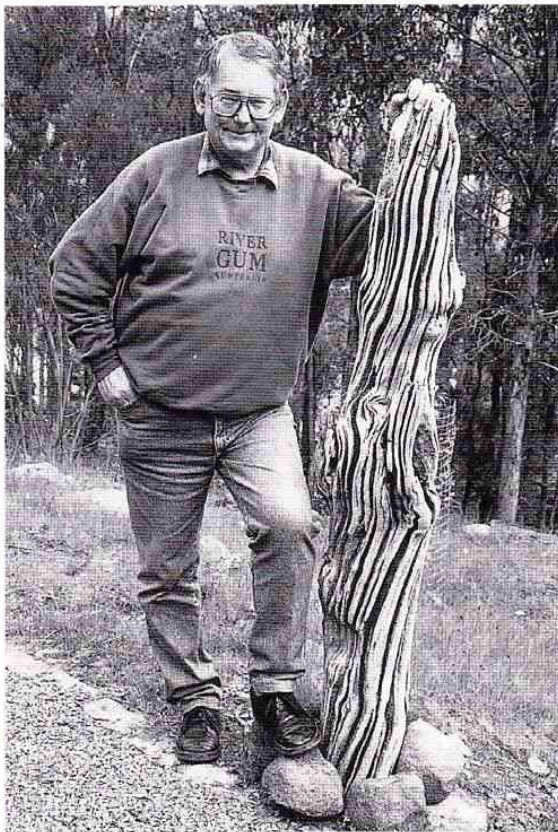
Collecting is one of those human activities which tends to defy logic, but is generally valued by others at some time in the future. It's easy to know the value of things in retrospect, especially when others, who have more insight, tell us.

The International Wood Collector's Society is a US-based, non-profit corporation 'dedicated to the advancement of information regarding wood' which came into being at a meeting of twenty four wood enthusiasts at a place called Cow Creek in Texas in 1947. Today's total membership numbers around 1,500, fifty of whom, in the third largest national grouping, are Australian.

Members are rank and file woodworkers, scientists, artists, dendrologists, botanists and technologists. All are collectors, many of whom base their collection on standard or uniform samples. The international standard sample of wood is 150 x 75 x 12.5mm, square edged, sanded smooth on the surfaces, and labelled with the common and scientific names—plus, according to individual preference, source of sample, date collected, and other essential data for scientific reference purposes.

Many others prefer a different, much less formal format for their samples. Rockhampton member Bill von Allmen is a keen turner and his wood collection of several hundred species takes the form of turned goblets 100 to 125mm high.

South Australian Neville Sanders, a former world trustee of the IWCS, is another who specialises in goblets as the basis of his collection but rather than keep the goblets at his home at Gawler, north of Adelaide, he passes completed batches on to the the SA Botanic Gardens' Museum of Economic Botany where they are displayed for the benefit of the thousands of visi-



The author in Judbury, Tasmania with his Tasmanian 'totem pole'—a log of tea tree deeply fissured, possibly a result of having been washed many kilometres down the Huon River.

tors to the gardens each year.

In NSW Barry Black, Quaama resident and immediate past Australasian Trustee of IWCS, shapes his samples in the form of an old boot about 63mm high. He has more than 400 'boots' and his collection now resides in the Bungendore Wood Works Gallery built near Canberra by David MacLaren, himself a former member of IWCS.

Overseas members have collections of miniature bowls, an interlocking wooden chain (close to 400 feet long containing almost 200 species), carved thumbs, wooden eggs, routed snowflakes, walking sticks, wooden bells,

bird-shaped stamp dispensers, miniature tree shapes, carved letter openers, Christian crosses, hour glasses—the variations are almost endless.

One American member, Lynn Frank, has to date turned five bowls each of which are made up of 100 species of wood. Frank Root and Pat Pastuszek of Massachusetts scroll saw samples into the name of the species.

In British Columbia in Canada David Etheridge has been making a desk for the last fifteen years into which he has incorporated over 300 species of world woods. Some collections reach immense sizes. Englishman Richard Crow, for example, has 6,000 species in his collection, achieved in 1994 and the culmination of 40 years of dedicated collecting. His standard samples are stored in shallow drawers back to back in big banks of shelves. Crow spent his working life in the timber industry and showed remarkable

initiative and perseverance in amassing his tally. At one time Crow wrote to all of the world's forestry research institutes, and later, to every principal island and group of islands he could find on a detailed world map!

Australia is a wonderful place to begin collecting timber, by virtue of the huge number of unique tree and shrub species it possesses. In just two genera alone, eucalypts and acacias, there are many hundreds of different species.

For more information on the IWCS write to the society's Australasian Trustee, Dr Eugene Dimitriadis, 39 Brinsley Rd, Camberwell, Victoria 3124.

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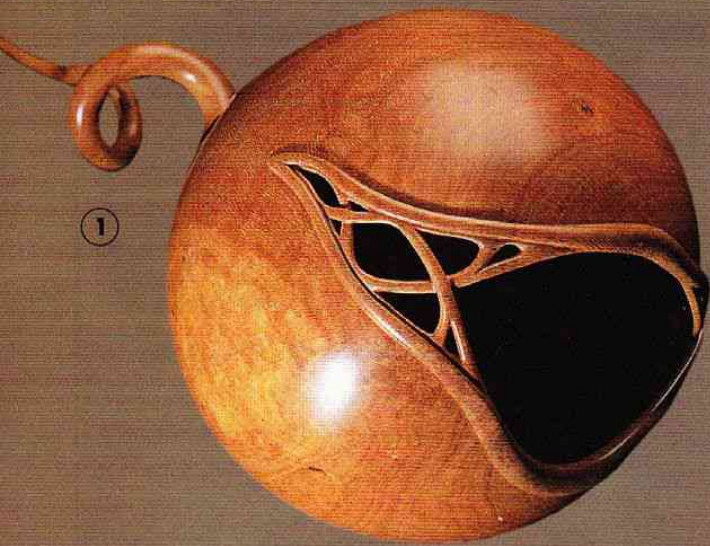
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WOOD D

AN EXHIBITION



①

1. The Messenger—Talisman Seed VIII, silky oak, jarrah, Stephen Hughes, Vic.
2. Lidded container, WA sheoak and Australian ebony by Andrew Marshall, WA.
3. Carved bowl, cedar by Neil Scobie NSW.
4. Hollow form, silky oak. Andrew Gittoes, WA.
5. River red gum bowl by Mike St Clair, NSW.
6. Red gum hollow form, Norman Peterson, Tas.
7. Huon pine and ebony form by Anthony Hansen, Qld.
8. Mallee Dream, Terry Martin, Qld.



③

②



⑦

④

6

DREAMING IN TO LAUNCH BOOK

The idea for this exhibition grew out of the recently published book, *Wood Dreaming* written by Australian woodturner and writer (and regular Wood Review contributor) Terry Martin. An Australia Council grant enabled Martin to spend the best part of two years travelling and researching for the book which now represents his vision of trees and wood as part of the Australian consciousness.

Wood Dreaming was recently launched in Martin's home town of Brisbane and the exhibition, also titled *Wood Dreaming*, included many of the pieces featured in the book. The exhibition represents a landmark in the history of the craft in its own right, partly because it directly links with a landmark publication, and partly because it represents a gathering of a top class body of work which is nationally sourced.

All the turners featured in the exhibition appear in Martin's book and many of them travelled to Brisbane for the launch of the book (including four from Western Australia), so high did they rank its importance. Such a confluence allowed a certain amount of bonding and interchange of experience which will further strengthen the woodturning movement in Australia. Australian woodturners already rank highly on the world turning scene, especially when the size of our population is taken into account. *Wood Dreaming's* worldwide distribution and promotion by Harper Collins will deservedly promote Australian woodturners both here and abroad.

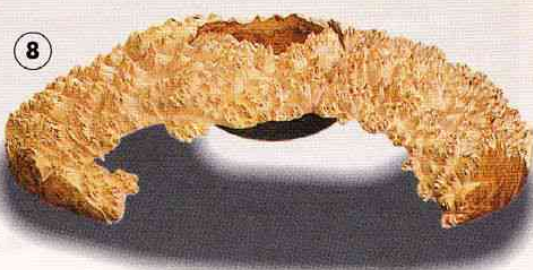
Two themes run through the book: trees and woodturning. The link in Terry Martin's mind is seamless and the book is a progression of his thoughts on these two subjects. Martin writes from his own experience and considerable research about trees as part of the Australian geographical and human landscape. He describes their fate since European colonisation, and contrasts this with the indigenous population's respect and usage of timber. The second half of the book illustrates the attitudes towards and usage of native timbers by woodturners, giving in brief a history of woodturning in Australia. About two thirds of the book is a snapshot of currently practising turners who represent many of the best known exponents of this craft. The subject matter is wide-ranging but the text flows easily and the progression feels natural.

The theme of environmental responsibility constantly surfaces throughout the book, both in Martin's own comments and through the numerous direct quotes of the turners throughout Australia who he has interviewed. Most woodturners are ardent conservationists and totally abhor any wastage of timber. Many work only with salvaged timbers which they usually harvest themselves.

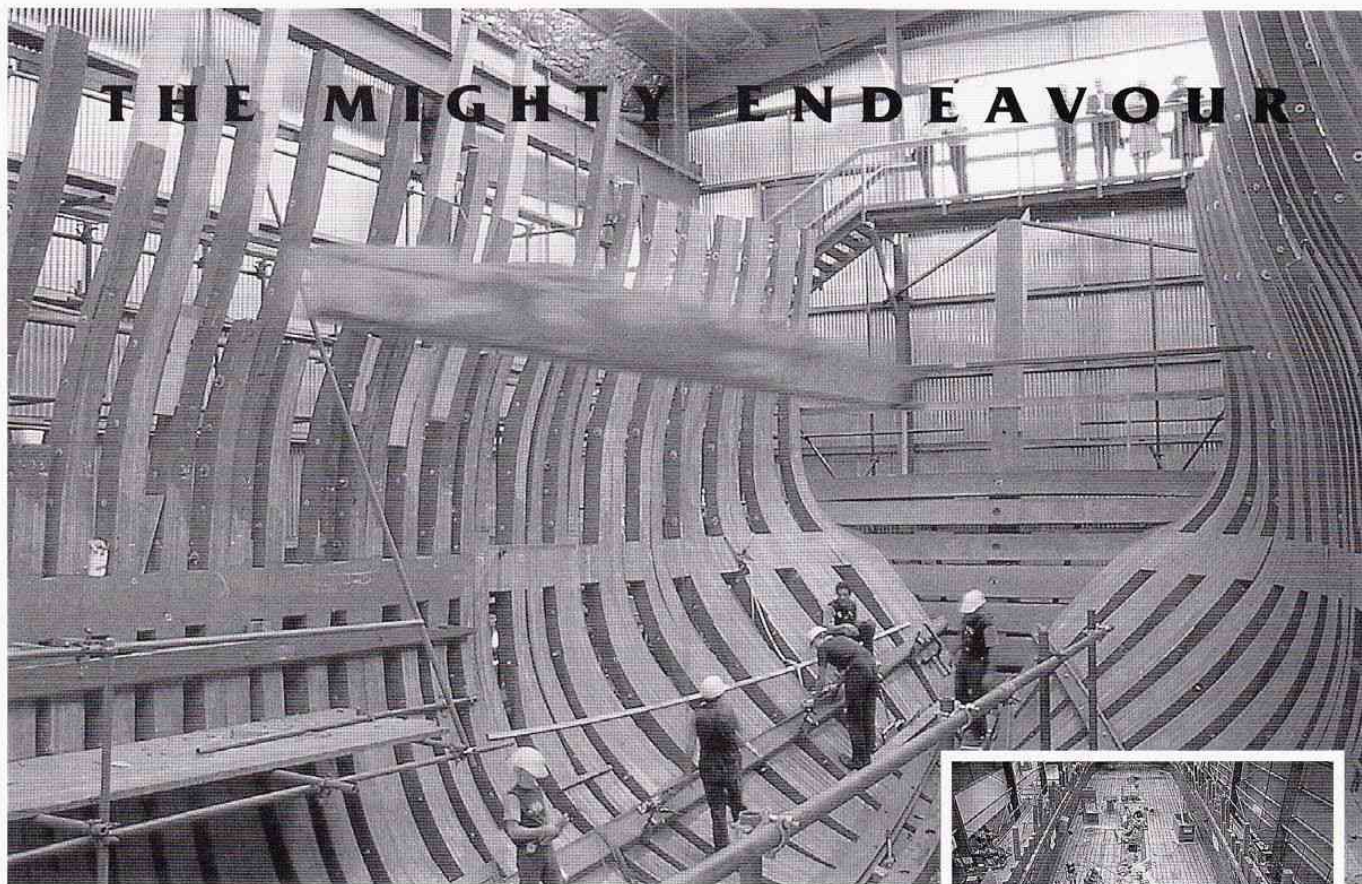
Martin draws links between the aboriginal ethos towards trees and woodworking and the current attitudes of Australian woodturners. In so doing he portrays a uniquely Australian movement which 'speaks the trees' through the craft of woodturning and even the trees themselves. 'Speaking the Trees' was in fact an alternative title which was mooted for the book.

Beautiful photographs accompany the text of what is the most significant Australian publication to date on woodturning and woodturners. The book is not concerned with technique, but rather with the human and idealistic side of the craft. It is definitely a book for woodturners, but also for Australians and those who want to know a bit about the Australian psyche and what makes us tick.

Wood Dreaming. Angus & Robertson, 1996.
Hardback, RRP \$75.00. Available through
Bookshelf, see p.94. Note: we have ten signed
copies for the first orders received.
Photos: Russell Stokes.



THE MIGHTY ENDEAVOUR



The Endeavour replica has been around for a while now but still continues to attract large crowds after its circumnavigation of this continent. The ship was commissioned in 1994 to celebrate the historical importance of Captain Cook's voyage to the Pacific which ranked him amongst the greatest maritime navigators of all time.

As a timber construction the replica represented both a challenge and a

labour of love which utilised the talents of many skilled woodworkers and tradespeople. The main differences between the original and the replica are in the timber used, the modern finishes, metal fastenings and fittings, and in the use of man-made materials for the sails and some of the ropes.

Instead of the traditional oak, elm and spruce, the replica is built mainly from Western Australian jarrah and

other Australian hardwoods. Old growth oregon (Douglas fir) imported from America has been used for masts, spars, topsides and decks. Internally the ship was fitted with modern engines, freezers, a desalination plant for water, modern waste systems and of course top line communication equipment.

Endeavour Trivia

The ship contains 290 tonnes of jarrah.

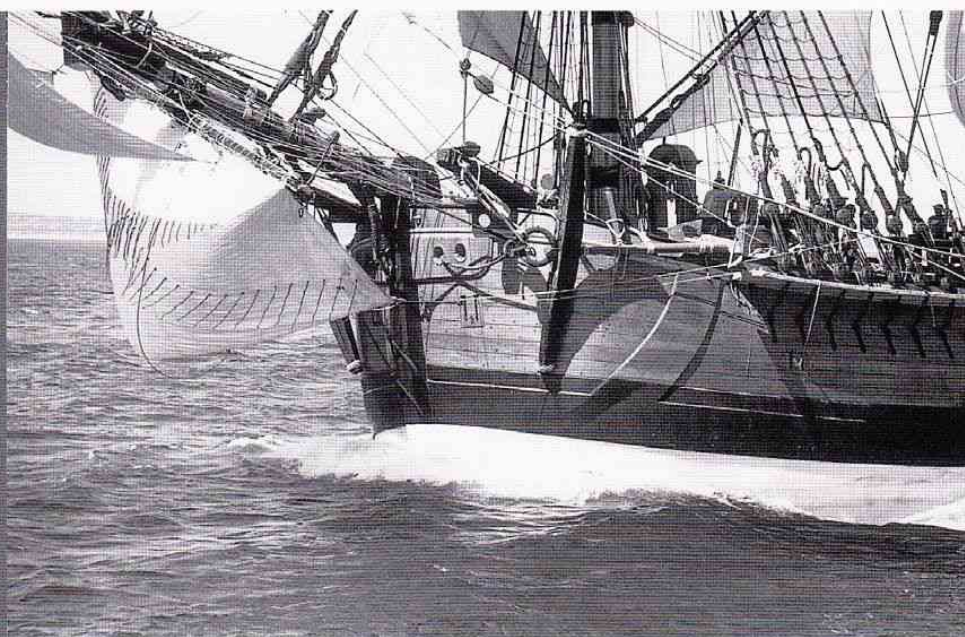
Decking is made of 500 year old oregon.

The ship contains 150 tonnes of lead

1 km of seams between the planks on each side below the water and 3 km of oakum used in caulking of the seams.

Around 3,000 tree nails (tunnels) were used in fastening the planking to the ship.

There is 9,538 square feet of sail area and 18 miles of rope used in the rigging.



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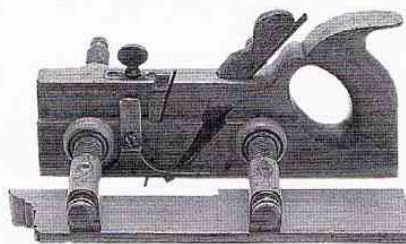
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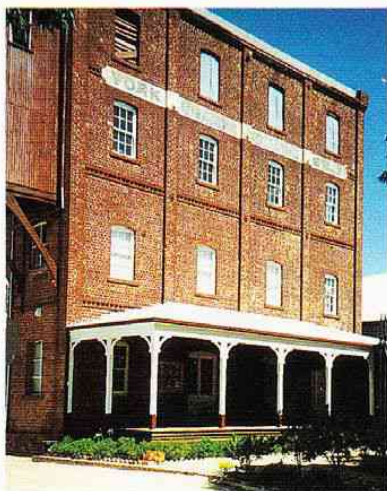
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GARY BENNETT & DAVID PARIS: JUST LIKE THE ROLLING STONES?



Brothers in law Gary Bennett and David Paris are friends first and last. If they weren't friends, says Paris, they would probably have ended up hating each other. It was only some eight years ago they formed a furniture making company called Jah-Roc, and, like jarrah and stone, the partners complement one another despite being in many ways dissimilar.

Gary Bennett sounds just as you would expect from the open face and burly build in the photo. Voluble, he is extroverted, full of ideas and understated conviction. There aren't too many people who tell you, without even raising their voice, that they're going to build a family empire, and that they just 'want to be the best in the world at what we do'—and sound perfectly believable.

Bennett and Paris seem to have the perfect business 'marriage' with Paris playing 'ying' to Bennett's 'yang'. Bennett is the front man and creative designer who sources and selects the beautiful timbers they use. Paris is the behind the scenes organiser, who according to Bennett, 'wanted right

from the start to organise and regiment what we did. He even prefers straight lines and is a real perfectionist.' 'If it were all up to Gary', Paris says, 'the place would fall apart'. Bennett is the one who says 'let's buy this, let's do that'. Paris is the one who figures out how to do it and makes sure it happens. He says he is "Keith Richards" to Gary Bennett's "Mick Jagger", though, he hastily adds, 'we're both much better looking of course'. After eight years building the business, working up to 18 hour days, Bennett and Paris don't look like they've even broken a sweat, where others might have suffered cardiac arrest.

When David Paris married Gary Bennett's sister Joanne, the bloodlines of the future family empire were secured. Self confessed workaholics, the pair are now, Paris says, working on changing that, as both have wives and two toddlers apiece. Bennett's mother and father also work in the business, after all, says Bennett, it was from them he inherited his extreme work ethic.

'We met in 1981 surfing in Queensland, when we were both bumming around Australia, bludging on the Sunshine Coast', tells Bennett. David Paris continued on travelling around the world for the next three years and then, at one of those crossroads of life (the end of a love affair), suddenly changed course, came back to Australia and went to visit Bennett who he had continued to keep in touch with. Paris, a cabinetmaker, joined the former carpenter, in a 'backyard operation' in Scarborough, Perth.

It was another surfing trip which spelt an end to the kitchen cabinet work which they had both grown to hate.

Bennett took a sketchbook along with his board and two weeks later, the pair returned relaxed and armed with a series of designs which would become Jah-Roc's 'Outback' range, still one of their best sellers. The pair set to and produced samples which were then shipped out to four or five galleries 'on appro'. 'Gone surfin' again' for another week they came back to find every piece had sold. A bread and butter line was born and kitchen days were over. 'Why would we', Bennett recounts: 'want to make chipboard boxes with plastic edgestrips and then spend three or four days grovelling around on our knees putting them in someone's house?'

The business developed from there, but not without growing pains. Some years ago they were advised to close the doors when the number-crunching husband of a former secretary 'pulled the business apart' and concluded it was going nowhere fast. Bennett recalls 'David was starting to wonder, but I said no: we had a dream'.

After the dream the rest is history. In 1993 the company relocated to York, a popular tourist destination about a hundred kilometres east of Perth. The four storey brick Old York Flour Mill, a fine, once derelict, example of early Australian industrial architecture now houses gallery and display area. Furniture is made in an adjacent shed which was formerly a grainstore. An on-site blacksmith forges the wrought iron detailing which features on some of the furniture.

Buying the mill was another of Bennett's passionate ideas and turned out, David Paris reflects, to be one their best moves. For the first nine months



The Jah-Roc team: back row from left: Geoff Stephenson, Thomas Brooks, David Paris, Gary Bennett, Zachariah Smith, Matthew Hammill. Seated: Sandra King, Kymm Luff, Quintin Skippings. Opposite: The Old York Flour Mill

they and their young families lived on site in tents in one of the adjacent sheds and worked night and day restoring the mill. The main building was re-roofed, floors, doors and windows were patched, rebuilt and, in some cases, replaced. The old grain chutes were left as architectural fea-

tures and give a great deal of character to the displays of furniture and other artworks which are housed about them.

How to make money out of making limited editions and one-offs is a question which bedevils many craftspeople and

artists. According to Bennett, making one-off pieces is 'egotistical', even 'showing off', so it's a matter of 'getting a reputation, making it big-time, so you can justify the worth of the prices you need to charge.

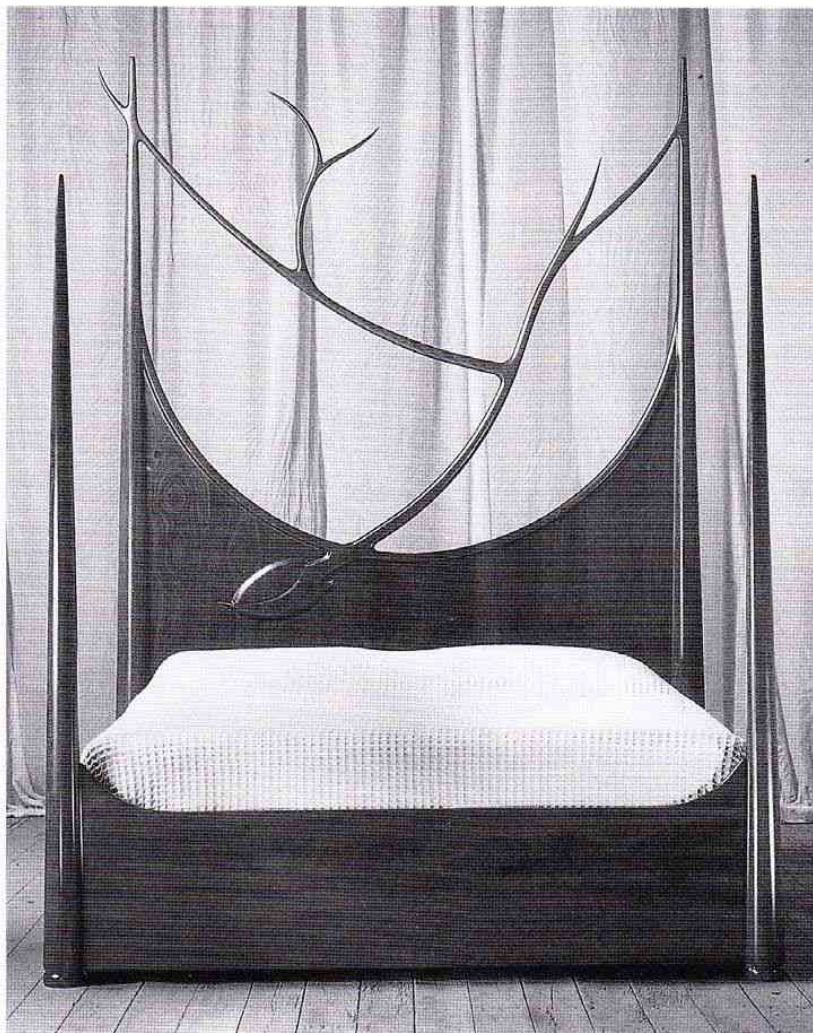
Jah-Roc manages to combine the pro-

duction of regular lines with the making of what the company refers to variously as 'masterpieces', 'hallmark', 'glamour' and 'legendary' pieces. Signature pieces such as the 'Boomer' or the 'Nature Display' cabinet are really only the tip of Jah-Roc's iceberg of production. The second only 'Boomer' ever made went recently to Switzerland for the sum of \$8,000. There is no intention to mass produce these 'company hallmarks'.

You might expect to see a little conservatism in bread and butter lines such as Jah-Roc's 'Outback' and 'Ironwood' ranges, each item of which, incidentally, is signed and numbered. Instead you will see asymmetry, organic forms, features made of what others call faults in timber, and quirky references to plant life, animal forms and aboriginal icons.

The 'Boomer' rocking chair (recently renamed 'Roo Silhouette' by Jah-Roc's advertising agency) was drawn in simple mimicry of the line of a bounding kangaroo. 'Returning Images' is a free-standing mirror shaped like an inverted tear drop, which rests on boomerang shaped supports of black granite. Carved lianas or native vines coil over other pieces such as Jah-Roc's 'Natural Display' cabinet. Germinating tendrils extend across the head of 'Life Begins', a king size four poster bed made from jarrah reclaimed from Bunbury Jetty.

Recycled, reclaimed or salvaged timbers often used, as are natural edged timber sections which make no secret of the evidence of insect, fire or human attack. The origin of the timber



'Life Begins', jarrah reclaimed from Bunbury Jetty, WA.

is marked on each piece; if reclaimed from buildings, bridges or warehouses for example, their date of building is also branded onto the piece.

With characteristic understatement Bennett says of their three years at York 'we've had a good run'. What is now a thriving business with an annual turnover of around \$750,000 and seven employees, has developed largely from the efforts of the partners who have 'picked up' their sales, marketing and managerial nous on the way. There have been a few sales courses and seminars on the way, like the one with real estate guru Tom Hopkins, and the course on TQM (total quality management) which had some influence. Bennett is driven by the conviction that the pair, highly skilled, should be able to command the sort of by-the-minute rates commanded by solicitors and accountants. To this end the company now has its own system of

accountability and linked incentive schemes.

The days on the factory floor are measured in quarter hourly increments—seven and a half minutes rounds up, below that doesn't count. Everyone has to keep a record of what they do and the time it takes, but Paris claims the system helps motivate staff to achieve personal bests. 'You can't price a job accurately if you don't add up all the time—that includes designing, thinking about it, every process along the way. And if it takes the guy next to you fourteen hours to make a table you might start to wonder why it's taking you a lot longer.' Even the hours of a beginning furniture maker must be charged out at \$55 to \$60 dollars to allow

for every single cost of production.

Of course, quality is not to be sacrificed in pursuit of record times. If the job is no good it takes even more time to fix. But, if a maker can complete a job to the high standards demanded, under the average time allotted, that person accrues holiday time and bonuses. Staff incentives also include a profit sharing scheme and being able to stay at the company holiday house.

David Paris jokes that he has dubbed 1996 as 'the year of the meeting' and indeed, communication is probably the key, he feels, to harmonious relations between partners, employees, families, if not the whole world! On Mondays there is a factory meeting where ideas are swapped and the occasional gripe is aired. Tuesdays after work, the sales staff meet for a quick recap and a gee-up for the week ahead. Once a week the partners meet with the factory foreman

for discussions, and in addition usually have a meeting of their own on Thursdays. Then there are board meetings once a month. There's nothing like a good meeting, says Paris, in fact 'sometimes, if you go longer than two or three weeks without one, you can feel people getting a bit edgy'.

Staff tend to stay, but there are a few who have left after extensive training to set up their own shingle down the road and naturally there is a certain amount of bitterness about this. The company has employed older, more experienced tradespeople, but, finding them harder to mould to a self-made company's ways, the preference is now to employ young people, training them intensively. 'They have to want to work though', says Bennett, 'it's no good when they really wanted to be an electrician and came to us instead'. At 34 and 33 respectively, Gary Bennett and David Paris are the company elders—everyone else is under 24 years of age. One of Jah-Roc's key people is Matthew Hammill who started with the company six years ago and now runs the workshop. Another long-serving member is Thomas Brooks who, like Hammill, is adept at various wood skills.

Marketing the company has been approached in a systematic fashion. The company now spends an annual \$30,000 to \$50,000 on advertising, which includes photography and the preparation of brochures, the services of an advertising agency, advertisements in print media and floor space costs in various shows about the country.

An estimated 80% of furniture sales come from the York gallery which, without much advertising effort attracts around five to six hundred a people a week, although the numbers can vary by as much as one hundred to two thousand some weeks. The pair struggled to get fifty people through the door of the Perth workshop, and that was with considerable expenditure on advertising. Dated from 1831 York is West Australia's oldest inland town. The Flour Mill was built in 1891 and last year an adjacent shed

of 2,000 square metres in size was the venue for the York Jazz Festival. This year a country and western festival, independently organised, will take place there and, needless to say, it won't hurt business at all.

Travelling to shows is a good break from business, but manning stands is hard work. Both partners do the selling and have developed good skills. You have to be able to assess your buyer's mood and tune into body language. Looks and clothes don't always indicate purchasing power either. The downcast passerby can end up buying a dining table if approached the right way—it's happened before says Bennett. A salesperson can either 'rugby tackle' (Bennett's words) the unsuspecting prospect or talk them round a bit more subtly.

Home shows, country shows, trade shows, even shows for agricultural machinery will do. I asked how could they possibly hope to sell such highly individual and 'different' furniture at venues such as the latter? With a laugh, Bennett explains 'you've got cockies walking around looking to buy a \$200,000 header—and well, the missus might want something for herself too!'

Jah-Roc was one of the first to be part of the now environmentally trendy and friendly use of recycled and salvaged timbers in Western Australia. Current favourites are marri, recycled oregon, and jarrah as you would expect—es-

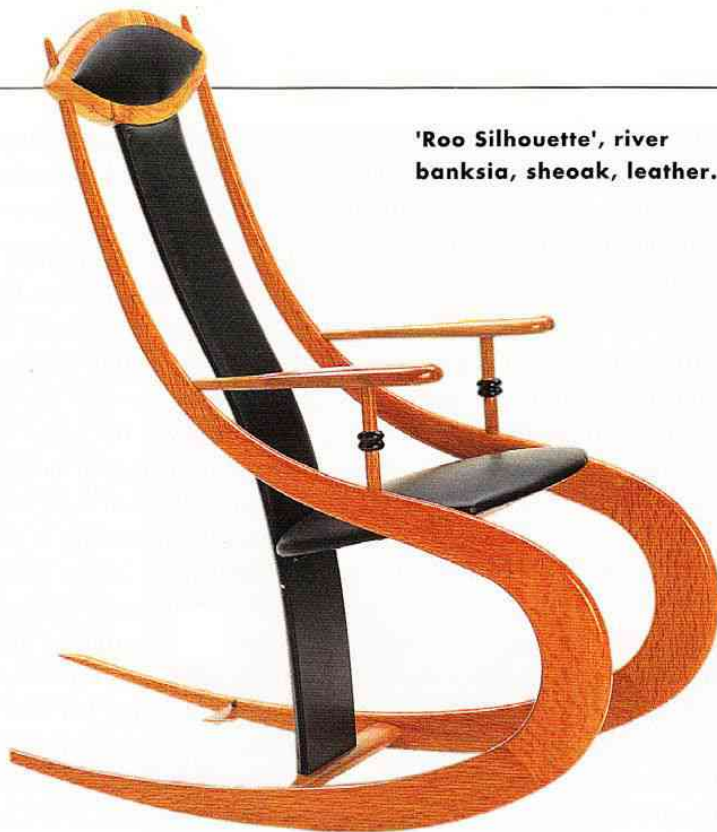
pecially curly and birdseye figured jarrah. Waney edges are back in fashion they claim.

And what of the future? Obviously family empires, indeed dynasties, are made to last. The future managers of Jah-Roc are still in nappies after all—and timber, bought green, can take years to dry in the racks. They made a commitment back in those surfing days and now, Bennett says, they will never stand still, aiming as they do to be the best. They might need more staff but they will never number more than twenty. Paris estimates more conservatively—they may need two more people in ten years time. The mill may develop more—there is an idea of building rammed earth chalets which may house other artisans and artists whose focus will be the gallery.

One thing David Paris sees clearly on the horizon is a fair deal of upgrading of machinery. The workshop is equipped with the machines the pair started out with, a selection of 'very basic, very cheap' machines which are no-name (can't remember, can't see) brands including saw, thicknesser, planer, a big old bandsaw, stroke sander, radial arm and rip saws. One good thing is the sealed sanding booth which stands 5 x 6 x 3 metres high. Paris would like to have much better machines but Bennett is more conservative in this respect 'why buy brand new when the old stuff is still working'.

'The Dowerin', an executive desk made from jarrah reclaimed from the Bunbury Jetty with inlay of sheoak and black granite.





'Roo Silhouette', river banksia, sheoak, leather.

(read 'hands on furniture making') hours for both reduced to around five a week in the case of Bennett and ten to fifteen for Paris. And with time sheet scoring such as theirs you can believe every statistic and date Paris rattles off. David Paris says he is never so happy as when making furniture—being unable to spend more time doing what you have made such a success out is one of the ironies and often tragedies of the small business operator.

Business is business but Jah-Roc make art. The wood is their medium, the outcome is furniture that is aesthetically pleasing and functional. Because they regard their furniture as art they continue to exhibit regularly at galleries and dabble in woodwork competitions where the name 'Jah-Roc' often tops the chart. In fact, with a steady stream of hits like theirs, the West Australian 'roc' duo of Paris and Bennett is sure to achieve its own legendary status as the 'rolling stones' of the Australian woodwork scene.

There is affection for the 'old' machines though. The twenty year old Altendorf panel saw is the one David Paris used during his apprenticeship and bought from his original boss ('I just told him I *have* to have your machine').

Paris reckons he can use it all day long without tiring.

David Paris modestly avows his partner to be the best maker in the workshop, however the demands of managerial responsibilities have seen 'productive'



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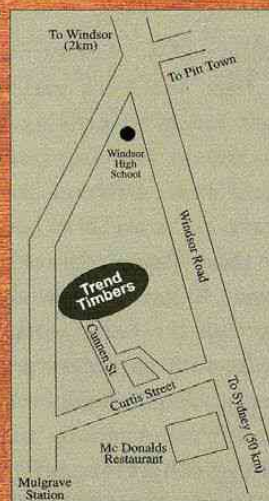
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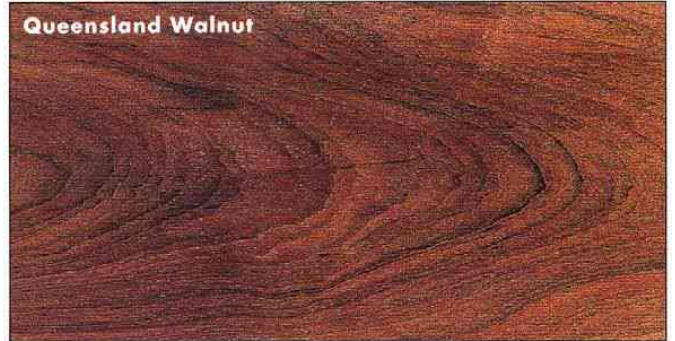


TIMBER FOCUS: WALNUT— BEAUTY AND STABILITY

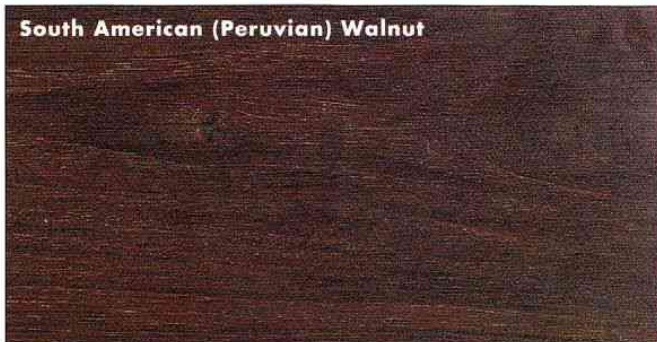
Repoh



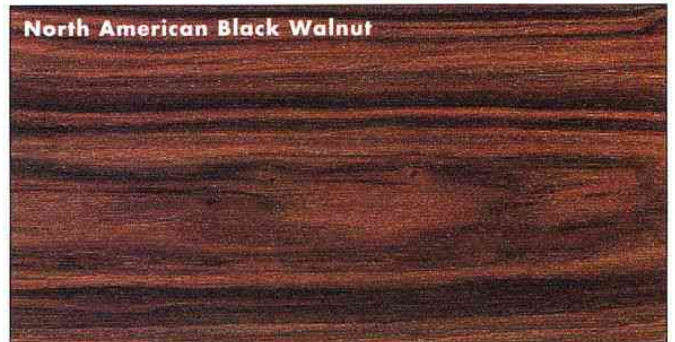
Queensland Walnut



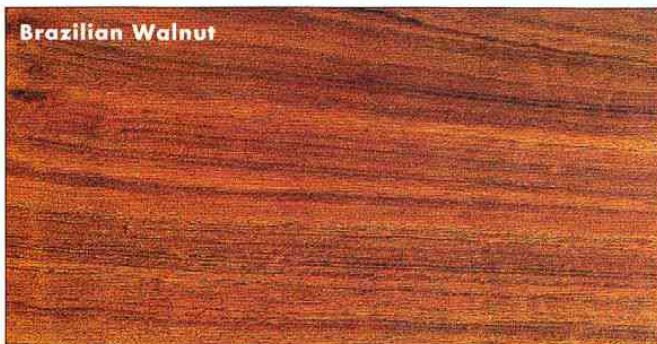
South American (Peruvian) Walnut



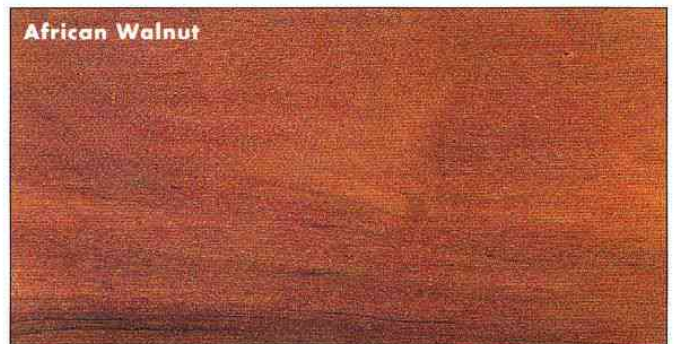
North American Black Walnut



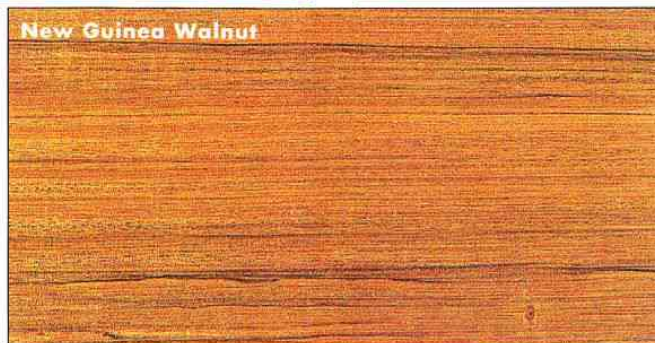
Brazilian Walnut



African Walnut



New Guinea Walnut



To most people 'walnut' means a dark, decorative timber typically used in high quality furniture and joinery. As with many other well known timbers the name has become generic and is applied to several species, which share some characteristics.

Price, variations in supply and fluctuations in market trends influence the demand and use of walnut in the 1990s. Without doubt, recent trends have favoured mahogany, various local and plantation species and pine, however history shows that walnut will rise in popularity again. Here are some of the prominent 'walnuts' and

other timbers which go by that name.

TRUE WALNUTS European Walnut

(*Juglans regia*)

While some confusion might stem from the common names, European, French, English, Italian and even Persian walnut

are all essentially the same botanical species. Differences in appearance are climatic and topographical, not political.

European walnut is reputed to work well with hand and machine tools, possesses medium bending strength and a very good steam bending classification. Medium movement

in service makes it suitable for high class furniture, joinery, turning and carving. Much of the furniture from the Queen Anne period was crafted from walnut. It is expensive and difficult to source.

North American Black Walnut

(*Juglans nigra*)

The more plentiful and darker North American walnut is more likely to be available here today than its European counterpart. Working properties, uses and bending classification is virtually identical to those of European walnut although American walnut is described as being durable whereas the European species is regarded as only moderately so.

South American Walnut

(*Juglans neotropica*)

Generally known in Australia as Peruvian walnut this timber is generally darker than both European and North American varieties. It does, however share good working properties and dresses to a finish aptly described as a 'silken lustre'.

OTHER WALNUTS

Queensland Walnut

(*Endiandra palmerstonii*)

This timber varies from light to dark brown, streaked with pinkish grey, green or black stripes on quartered surfaces. Planed surfaces are quite lustrous. The black striped variety probably resembles North American walnut more than the other two.

Both in texture and in weight, it compares closely with a true walnut although in appearance it is a little more striped.

This is an abrasive wood to work with hand or machine tools because it contains silica. Uses are similar to those of true walnut. It is non-durable.

New Guinea Walnut

(*Dracontomelum mangiferum*)

This timber is often aged or distressed to resemble European walnut. Buyers should note that only the heartwood is figured, while the greater proportion of each log is pale and bland. Only the figured timber will in any sense resemble a walnut. This timber also has an allure for pin-hole borer and the minute damage caused by this insect is almost impossible to detect in a rough sawn board.

New Guinea walnut machines well and polishes satisfactorily. Its bending qualities are medium. It can be used for the same purposes as true walnut, but while it is definitely cheaper, the variation in character and the risk of pin-hole borer are factors that any potential buyer should bear in mind. Supplies are inconsistent.

African Walnut

(*Lovoa klaineana*)

This central west coast African species resembles true walnut. Typically gold/bronze/orange/brown this timber noticeably deepens in colour over time. It is commonly marked with long black streaks or veins which run at regular angles along or across boards. Flat sawn surfaces in particular give a 'walnut' look. African walnut is readily available and a little cheaper than a true walnut. Its uses coincide with those of true walnut and reportedly works well with both hand and machine tools, although quartersawn timber has a tendency to pick up during planing.

Brazilian Walnut or Imbuia

(*Phoebe porosa*)

This is a superior South American species whose colour, character, working qualities and finish resemble a true walnut. In my own and very subjective opinion, I believe that every board of Brazilian walnut selected holds the potential to be more beautiful or enchanting than the one that precedes it. Arguably there are few more attractive and unpredictable species.

The heartwood is yellow olive to chocolate brown with variegated streaks and stripes. It is stable and moderately hard to heavy. It has high class applications but a fairly low bending classification. Wider boards in a range of thicknesses are readily available and price is on a par with the true walnuts.

Reposh

(*Chukrassia tabularis*)

This Malaysian species is part of the Meliaceae family but despite the direct link between that family and the mahoganies, it more closely resem-

bles the walnuts in characteristics, marking and colour.

Reposh is moderately hard, heavy and very strong. Back or flat sawn boards generally produce a beautiful 'cathedral' grain appearance in this walnut-brown timber which darkens significantly on exposure. Contrasting gold and black rays add depth to the appearance. Radial sawn boards are significantly plainer and the sapwood is defined sharply from true-wood.

This timber is moderately fine and uneven and silica is sometimes apparent in boards. It is sometimes likened to the famous Indian species chikrassy. It is readily available in wide boards and squares and is much less expensive than the true walnuts.

Special Qualities Of A True Walnut

Although a true walnut requires time to season (and does shrink considerably during this period), once dry it is extremely stable, for this reason it is the best known timber used in gun and rifle stocks.

Other qualities which enhance its reputation for this purpose include:

- An inherent strength, toughness, elasticity and 'shock resistance'.
- Appropriate weight which assists in weapon balance.
- Freedom from troubles which affect other timbers, for example, splitting, shrinkage, brittleness or liability to dent.
- Good working properties.

Aeroplane propeller blades have been made of walnut for all of the reasons above as well. Finally, walnut is beautiful and carves well. It has been widely used for decorative purposes. Walnut panelling is used in walls, desks and in the dash boards of some motor vehicles. Any of the walnuts discussed here, with their unique and versatile character are well worthy of your consideration.

Lester Oldham is Director of Australian Furniture Timbers in Port Melbourne.



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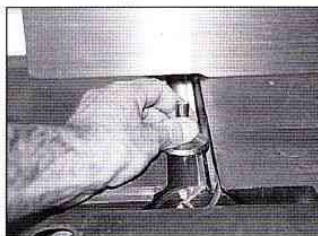
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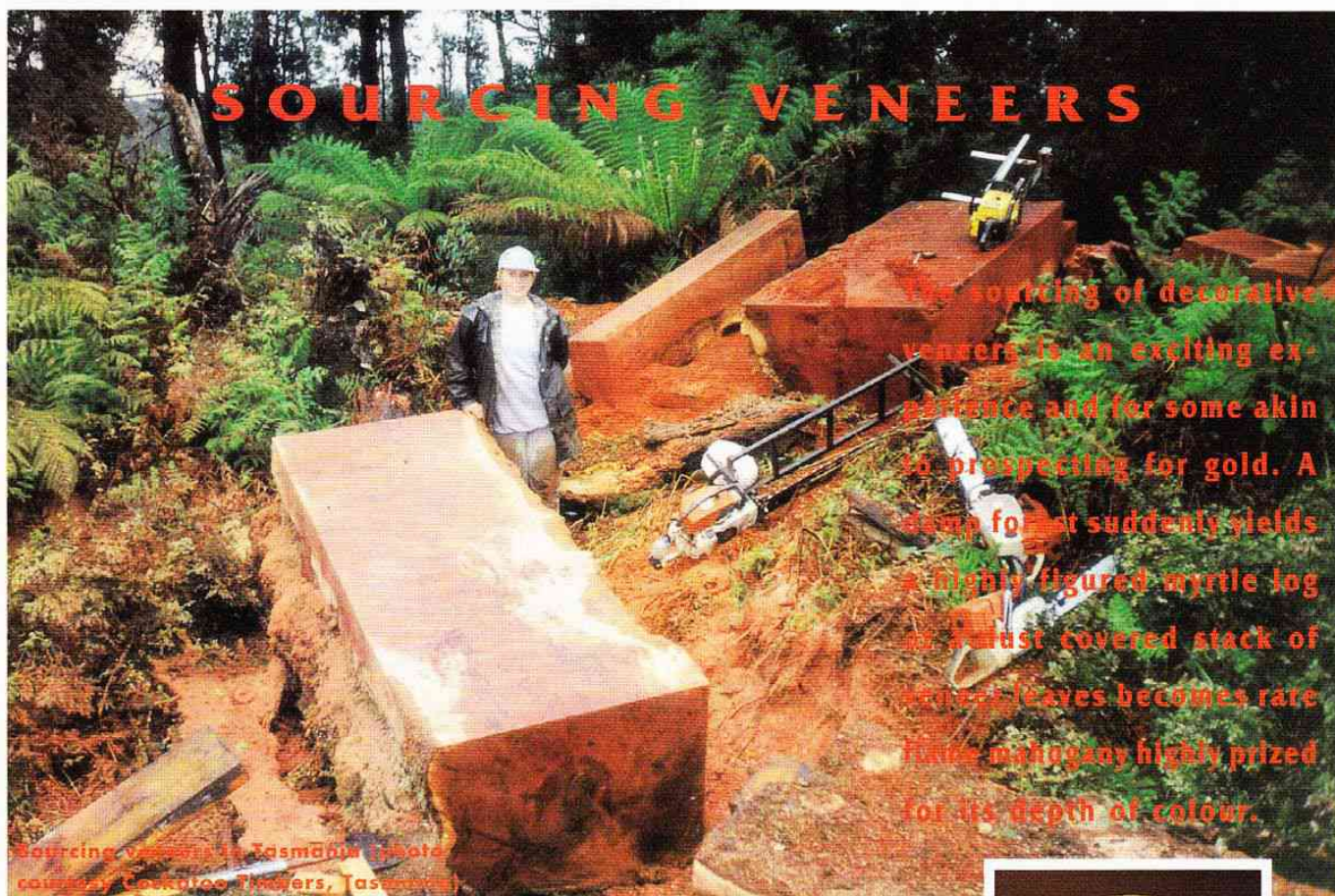
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SOURCING VENEERS



The sourcing of decorative veneers is an exciting experience and for some akin to prospecting for gold. A damp forest suddenly yields a highly figured myrtle log or a must covered stack of veneer leaves becomes rare flame mahogany highly prized for its depth of colour.

Sourcing veneers in Tasmania photo courtesy Cockatoo Timbers, Tasmania

Veneer is made by slicing or sawing large sections of timber into thin leaves. It may seem paradoxical to convert a large, precious log into slices, which may be thinner than a millimetre, however that's what slicing veneer is all about. As timber becomes more and more highly valued, veneering has come to be regarded as a practical and environmentally sensitive way of using that resource.

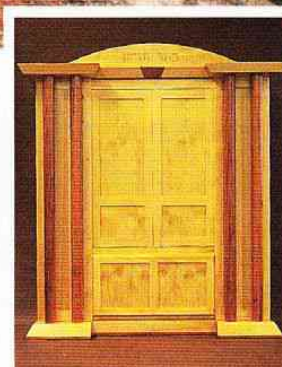
The majority of veneer sliced in Australia comes from Tasmania, Western Australia and Queensland. Imported veneers are however sourced from all over the world. Veneer timbers come from all types of forest but some are only found in remote, magical places. The best logs are selected for veneer and, depending on the slicing method employed, are either sawn into flitches or left as logs.

Peeling is carried out by mounting clean, straight logs in what resembles a giant lathe. The spinning log is pressed into a knife which slices the veneer in a continuous leaf. Building plywoods are a good example of peeled veneer.

Slicing is where a flitch is placed in a carriage or holder. Leaves are cut with a knife in either a straight or arced movement. Decorative interior type panels are examples of sliced veneer. Whether they are crown or quarter cut will depend on the timber species and the type of grain pattern required. The normal thickness of the veneer is 0.6mm although thinner and thicker leaves are available.

After slicing the veneer is dried and graded and is then ready for the market via specialist merchants. Australian veneer suppliers offer varied services. Some only sell pressed board while others only sell veneer leaf; some carry a huge range whilst others have a limited but select number of species; and of course some are huge companies whilst others are smaller family run concerns.

Pressing is the process of edge joining prepared leaves and gluing them to a substrate which is usually MDF, plywood or particleboard. The actual process is of course a highly skilled operation carried out by experienced tradespeople. There are many varia-



Religious ark with huon pine veneer panels from Mayze Corp. in Melbourne.

tions of grain arrangement possible in pressing. Veneers may be book-matched, slip matched, reverse slip-matched and mis-matched. For more complex pressing there are specialist firms who handle lay-ups such as sunburst, cross bands and special one-off designs.

Once pressed, the veneered board is ready for many varied applications—ranging from the highest of top end furniture and architectural fittings, right down to cheap everyday household goods.

Whatever the level you are specifying or making for there is a veneer merchant who specialises in one or more particular areas to handle your

needs. Choosing your merchant will depend to some degree on the volume you are buying. Architects and designers of commercial work are usually encouraged to visit merchants to view their stocks.

Normally you purchase leaves of veneer in bundles or buy the veneer already pressed onto sheets. Buying loose veneered sheets is no problem, but trying to buy one leaf is—the company that supplied veneer for the new casino may not want to sell you one leaf of rosewood. On the other hand there are merchants who specialise in supplying small quantities of veneer (including inlay bandings and motifs) to furniture makers and marqueters wanting special colours and species for detail work.

In general the choice of veneered sheets have a core of either MDF or particleboard. The most common size is 2400 x 1200mm with thicknesses at 4, 6, 12, 16, 18, 25 and 32mm. Other sizes are available although sometimes only to order and these include sheet lengths of 1800, 2100, 2700 and 3600mm in 900 and 1200mm widths. Some merchants will of course have other sizes.

As the table on p. 62 and 63 shows there is an extensive range of timbers available. Remember that not all veneers listed are available in solid section in Australia, so it pays to check this out before taking on any job requiring both solid and veneer. Veneer merchants do however carry matching edge stripping in 0.6mm thickness and very long lengths. Some merchants also stock small sectioned matching timber for edge work while there is a new extra thick 3mm edging coming onto the market.

Timber in the architectural and furniture industries is very fashion-based. The current trend is for the lighter coloured woods. Despite ongoing 'buy Australian' campaigns the current favourites are imported beech, sycamore, Swiss pear, maple, birch, anegre, and cherry. Popular Australian timbers are ash and Tasmanian oak, myrtle, and silky oak. Out fashion at the moment are any rainforest timbers with a doubtful source. Australian veneer producers are successfully bringing to the marketplace 'new' local timber veneers such as brushbox, blue gum, redgum and flooded gum, amongst others.

Veneered decorative sheets come with a good face and a downgraded face. So-called downgraded faces have been known to have the more interesting grain, so check your sheets well. Because the actual veneer is so thin care is needed in sawing the sheets. Tungsten blades are a must and the best cut comes from saws fitted with scribing blades.

Timber veneers are the way of the future. Well known in furniture and joinery, veneered picture frames, architraves, skirtings, doors, beams and floors are now becoming common. There is no other comparable method of maximising standard, rare and exotic timbers which at the same time multiplies the range of options for timber usage.



Above: Table veneered in eucalyptus burl. Photo courtesy Cockatoo Timbers, Tasmania.

Below: Staircase made by Schiavello Commercial Interiors. The three layers of 1.5mm veneer were pressed by Lacey's (Timberwood Trading), Melbourne.

Lower: The NSW Leagues' Club interior designed by architect, Stanic Harding. Figured Swiss pear was supplied by Albart Trading and contrasts with brushed stainless steel panels.



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Timber Species

Origin

Colour

Suppliers

Afromosia (<i>Pericopsis elata</i>)	Africa	golden	1,13
Amoora (<i>Amoora</i>)	PNG	brick-red	2
Anegre (<i>Anigeria</i>)	Africa	yellow/cream	1,3,4,6,7,12,13
Aqua Taun (<i>Pomejia</i>)	PNG	pink-brown	2
Ash, Tas/Vic (<i>Euc. regnans</i>)	Australia	pale cream	6,3,11,12,13
Ash burl, Am (<i>Fraxinus sp</i>)	USA	white	1,7,9,13
Ash, White Eur (<i>Frax. excelsior</i>)	Europe, USA	yellow	1,6,12,13
Baltic Pine (<i>Picea abies</i>)	Europe	blonde	3, 4,6,13
Beech (<i>Fagus sylvatica</i>)	Europe	light gold/pink	1,2,3,6,7,13
Birch (<i>Betula papyrifera</i>)	Canada, Scand.	white	1,4,12,13
Blackbean (<i>Castanospermum australe</i>)	NSW, Qld	deep brown	3,6,7,11,13
Blackwood (<i>Ac. melanoxylon & sp.</i>)	Tas, Qld	gold/dark/brown	3,6,7,9,10,11,12,13
Blackwood, fiddleback, fig.	Tasmania	gold/red brown	1,9,10,12,13
Brushbox (<i>Tristania conferta</i>)	NSW & Qld	mauve/brown	3,4,6,11,13
Brushbox (<i>Lophostemon confertus</i>)	NSW & Qld	pink /grey/ br.	6,7,13
Bubinga (<i>Guilourtia demeusei</i>)	Africa	purple/red	1,3,7,12,13
Cherry, Am. (<i>Prunus serotina</i>)	USA	blonde/br./red	1,3,4,6,7,11,13
Cedar, Fiji (var. <i>Myristicas</i>)	Fiji	pink/ light br.	13
Celery Top Pine (<i>Phyllocladus aspleniifolius</i>)	Tas.	pale yellow	6,9,10,11,13
Chestnut (<i>Castanea sativa</i>)	Europe	grey	1
Daniella (<i>Leguminosae</i>)	West Africa	gold brown/pink	3
Ebony (<i>Diosryos sp.</i>)	P.N.G.	black striped	9
Ebony, Macassar (<i>Diospyros macassar</i>)	Asia	black/brown	1,2,12,13
Elm (<i>Ulmaceae family</i>)	Nth America	brown/red	11,13
Elm, burr (<i>Ulmaceae family</i>)	Nth Am.	brown/red	7,12
Erima (<i>Octomeles</i>)	PNG	grey/ purple	2
Eucalyptus burr	Aust.	cream/brown	12,13
Fig (<i>Ficus</i>)	PNG	white pale yell.	2
Hoop Pine (<i>Araucaria cunninghamii & sp</i>)	Australia	blonde	7,11,13
Huon Pine (<i>Lagarostrobos franklinii</i>)	Tasmania	golden	10, 11, 12,13
Huon Pine, birdseye/fig.	Australia	golden	9, 10,12
Jarraah (<i>Eucalyptus marginata</i>)	W. A.	red/br./pink	3, 4,6,7,8,11,12,13
Kamarere (<i>Eucalyptus</i>)	PNG	red-brown	2
King William Pine (<i>Athrotaxis selaginoides</i>)	Australia	light brown	9,10,13
King William Pine, birdseye	Aust.	pink/brown	10,12
Kingwood (<i>Dalbergia cearensis</i>)	Brazil	mauve/red stripe	11
Koto quarter cut (<i>Sterculiaceae</i>)	West Africa	creamy/white	3,12,13
Koto (<i>Pterygota</i>)	West Africa	creamy white	6,13
Lacewood burr (<i>Pterocymbium</i>)	PNG	white to cream	12
Lacewood, White (<i>Pterocymbium</i>)	PNG	white to cream	2, 11, 12
Leatherwood (<i>Eucryphia lucida</i>)	Tasmania	light pink to red	10, 12
Madrona Burr (<i>Arbutus menziesii</i>)	USA	pink/red	1,7,12, 13
Mahogany (<i>Khaya ivorensis</i>)	Africa	red/brown	3, 4, 12
Makore, quart., crown, fig. (<i>Sapotocaeae</i>)	West Africa	cream/tan/red	3, 4,13
Mallee, rib fruited (<i>Eucalyptus corrugata</i>)	Aust.	brown/yellow	8
Maple (<i>Acer family</i>)	Nth America	brown/red	11,13
Maple, Am. Rock/Hard (<i>Acer saccharum</i>)	USA	white	1, 3, 4, 6, 7, 13
Maple, birdseye (<i>Acer spp</i>)	Canada	white	1,4,12,13
Maple burr	Canada	cream	12,13
Maple, Qld (<i>Flindersii brayleyana</i>)	Australia	light red/mid-br.	3, 6, 11, 13
Maple, Quilted (<i>Acer sp</i>)	USA	cream/pink	13
Meranti (<i>Shorea spp</i>)	Asia	pink to light red	4,13
Mountain Oak (<i>Quercus rubra</i>)	USA	pink	1,13
Musk plain, burl (<i>Olearia argophylla</i>)	Australia	pink yellow/lt br.	1,9,10
Myrtle (<i>Nothofagus cunninghamii</i>)	Australia	pink/purple	1,3,4,6,7,10,11,12,13
Myrtle Beech (<i>Nothofagus</i>)	PNG	pink-brown	2

IN AUSTRALIA

Timber Species	Origin	Colour	Suppliers
Myrtle burl, burl (<i>Noth. cunninghamii</i>)	Tasmania	light red to pink	1, 9, 10, 13
Myrtle, Tiger/Blackheart (<i>Noth. cunninghamii</i>)	Tas.	pink/dark stripes	9, 10
New Age Veneer (plantation poplar)	Italy	numerous	5
New Guinea Rosewood (<i>Pterocarpus</i>)	PNG	red/gold/br.	1, 2, 3, 13
Nutmeg (<i>Myristica</i>)	PNG	pink-brown	2, 11
Nyatoh (<i>Palagium sp</i>)	SE Asia	pale to red br.	3, 4, 6, 13
Oak, American (<i>Quercus sp</i>)	USA, Can., Eur.	white/grey-br.	3 4, 6, 7, 9, 11, 13
Oak, burr (<i>Quercus sp</i>)	Europe, Am.	tan	7, 12, 13
Oak, European (<i>Quercus sp</i>)	Europe	tan	7, 12
Oregon (<i>Pseudotsuga menziesii</i>)	Nth America	blonde/golden	3, 4, 6, 7, 13
Padauk (<i>Pterocarpus soyauxii</i>)	Africa	red	1, 12
Pearwood (<i>Pyrus communis</i>)	Europe	pink	4, 6, 7, 12, 13
Pencil Cedar (<i>Palaquium</i>)	PNG	pink-brown	2
Pommele Makore (<i>Tieghemella heckelii</i>)	Africa	red/brown	1, 7, 13
Pommele Sapele (<i>Entandrophragma cylindricum</i>)	Af	red	1, 7, 13
Poplar (<i>Populus sp</i>)	Australia	white/cream	13
Poplar burr (<i>Populus sp</i>)	Europe	cream	1, 7, 13
Purple Heart (<i>Deltoryne sp</i>)	South America	purple	9, 12
Radiata Pine (<i>Pinus radiata</i>)	Aust/NZ	off white	3, 4, 6, 7, 13
Red Beech	New Zealand	pink/red	1
Red Cedar (<i>Toona Australis</i>)	Australia	pink/red	1, 3, 6, 7, 9, 11, 12, 13
Red Morrell (<i>Euc. congiornis</i>)	W A.	red/mulberry	8
Rimu (<i>Dacrydium cupressinum</i>)	New Zealand	orange/red	1, 3, 6, 13
Rose Gum (<i>Eucalyptus grandis</i>)	Australia	pink	7, 12, 13
Rosewood (<i>Dalbergia nigra</i>)	Brazil	mauve/red black	11, 12
Rosewood, Ind.) (<i>Dalbergia latifolia</i>)	India	purple/mauve	11
Sapele (<i>Ent. cylindricum</i>)	W.&E. Africa	med/dark red br.	1, 3, 4, 6, 7, 13
Sassafras (<i>Atherosperma moschatum</i>)	Tasmania	gold/blk heart	1, 6, 10, 11, 12, 13
Sen (<i>Acanthopanax ricinofolus</i>)	Japan	yellow/light br.	1, 6, 13
Silky Oak (<i>Grevillea spp</i>)	Australia	pink/copper	3, 4, 6, 7, 9, 11, 12, 13
Silver Ash (<i>Flindersia bourjotiana</i>)	Australia	blonde	3, 6, 11, 13
Spotted Gum (<i>Eucalyptus maculata</i>)	Australia	brown	13
Steam Beech	Australia	red	4, 6
Swiss Pear	Europe	pink	1, 7, 13
Sycamore (<i>Acer pseudoplatanus</i>)	Europe	white/blonde	1, 4, 6, 7, 11, 12, 13
Sycamore, White (<i>Cer. succiryeum</i>)	Europe	White	13
Sydney Blue Gum (<i>Eucalyptus saligna</i>)	Aust.	pink to red	3, 7, 13
Tas. Ash/Oak (<i>E. regnans, delegatensis, obliqua</i>)	Aust	cream/med.br.	1, 3, 4, 6, 7, 10, 13
Tasmanian Oak burl (<i>Eucalyptus obliqua</i>)	Tas.	light to med. br.	10, 13
Teak (<i>Tectone grandis</i>)	S.E. Asia	golden brown	1, 3 6, 11, 12, 13
Tulipwood (<i>Dalbergia frutescens</i>)	Brazil	pale pink, stripey	11
Turpentine/Luster (<i>Syncarpia sp</i>)	Australia	brown	1, 13
Vavona Burr (<i>Sequoia sempervirens</i>)	USA	red	1, 7, 12, 13
Walnut, Qld (<i>Endiandra palmerstonii</i>)	Australia	grey/gold, br	1, 3, 4, 6, 11, 12, 13
Walnut (<i>Juglans regia</i>)	Europe	light grey/br.	1, 11
Walnut, Am. (<i>Juglans nigra</i>)	Nth America	dk grey/mauve	1, 4, 6, 7, 11, 13
Walnut (<i>Dracontomelon</i>)	PNG	grey-brown, blk	11
Walnut, English burl (<i>Juglans sp</i>)	UK	brown	9
Walnut Burr (<i>Juglans nigra</i>)	USA	dk grey, mauve	1, 7, 12, 13
Wattle (<i>Acacia sp</i>)	PNG	gold/br., red	2
Wenge (<i>Millettia laurentii</i>)	Africa	brown/blk stripe	12, 13
Western Red Cedar (<i>Thuja plicata</i>)	Canada/USA	choc. br./pink	3, 6, 7, 13
White Ash (<i>Euc. fraxinoides</i>)	USA	blonde	4, 7, 13
White Oak (<i>Quercus alba</i>)	USA	light cream/grey	1, 3, 7, 13
Zebrano	Africa	black/white	1, 12, 13

SIZE OF LEAVES

Leaf size varies according to species, the way the veneer is cut, and the characteristics of each particular log, so it is not possible to give a standard figure for each species.

WIDTH

Generally leaf width can range between 120mm to 450mm for crown or quarter cut veneers, and up to 900mm for rotary peeled veneers.

LENGTH

Length is typically between 1.9 and 3.2m. Burr veneers come in much smaller sizes and are generally squarer in dimension. Although it is possible to get leaf sizes around 1000 x 1000 mm, they are more usually in the range of 300 to 600 mm. Veneers supplied for marquetry may be supplied in small sizes/quantities.

PRESSED SIZE

Veneer can be made into a wide range of sheet sizes depending on the panelmaker who is pressing it. Typical lengths vary from 1 to 3.6 m, and widths from 0.6 to 3 m.

AVAILABILITY

This ranges from ex-stock to very rare in some cases and is further complicated by limited sizes and quantities which may be available.

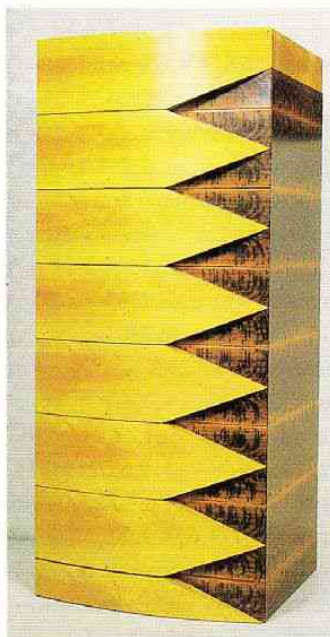
Check with your supplier in every case who will advise on availability and substitutes. In some cases it is possible to place orders.

MYRTLE: THE OTHER TASMANIAN TIGER?

Right: 'Tiger Chest' by Kevin Perkins of Tasmania is made from huon pine, tiger myrtle and purpleheart.

Right: Lidded containers made from tiger myrtle by Ponrabbal Timber Products of Tasmania.

Below: Cabinet by James Salmond and 3rd year apprentice Robert Huntley of Waitara, NSW. Tiger myrtle veneer was supplied by Cockatoo Timbers in Tasmania.



Myrtle (*Nothofagus cunninghamii*)

Tasmania's signature rainforest tree gives a pink to red fine grained timber, prized for furniture, wood turning and panelling. Some trees develop large burls, with highly figured wood that is valued for veneer and woodcraft.

Myrtle (*Nothofagus cunninghamii*) is the predominant timber species in Tasmania's cool temperate rainforests. It has a regeneration cycle which can lead to a forest containing trees ranging from one to 500 years old.

Surprisingly, it is myrtle's susceptibility to rot which gives rise to a variety of interesting markings such as tiger spot and blackheart. Once harvested the spread of rot is arrested, and when sliced or peeled these and other markings such as fiddleback and burl may be revealed.

The reddish wood is very strong and when used for flooring and decking wears well and keeps its smooth sur-

face. Its value for furniture and decorative work is well-known. Myrtle works well and takes a fine polish.

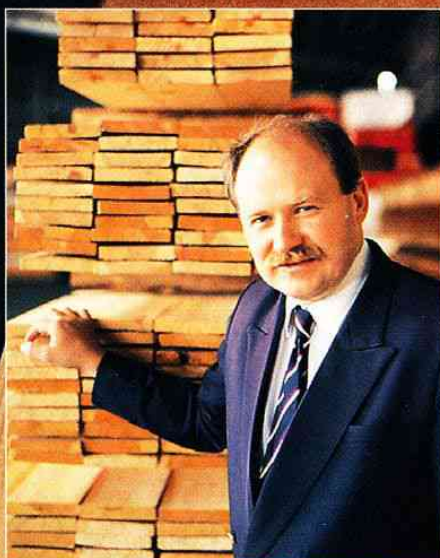
Colour can vary from pink to pale reddish-brown, sometimes with pale yellow-grey streaks. Sapwood is usually white to light pink. The grain is straight or slightly interlocked but occasionally wavy. The texture is fine, even and smooth. Growth rings are visible but not conspicuous.

Tasmanian furniture designer Kevin Perkins works as a lecturer in Wood Design at the Centre for the Arts in Hobart and has been designing and building furniture for over 20 years. Most of his work now is with veneers in special species timbers such as myrtle,

huon pine, sassafras and celery top pine. Perkins likes working with huon pine and myrtle in particular, considering them timbers with 'great tone and character'. In fact, Perkins says, 'where sawmillers sometimes see defects like rot or spalting in the wood, some furniture makers can see a unique feature or highlight.'

Myrtle is available from many of the producers in the northern part of Tasmanian and seasoned stock can be obtained in the south. Myrtle accounts for about one per cent of sawn timber production in Tasmania.

See page 62-63 for suppliers of myrtle veneer.



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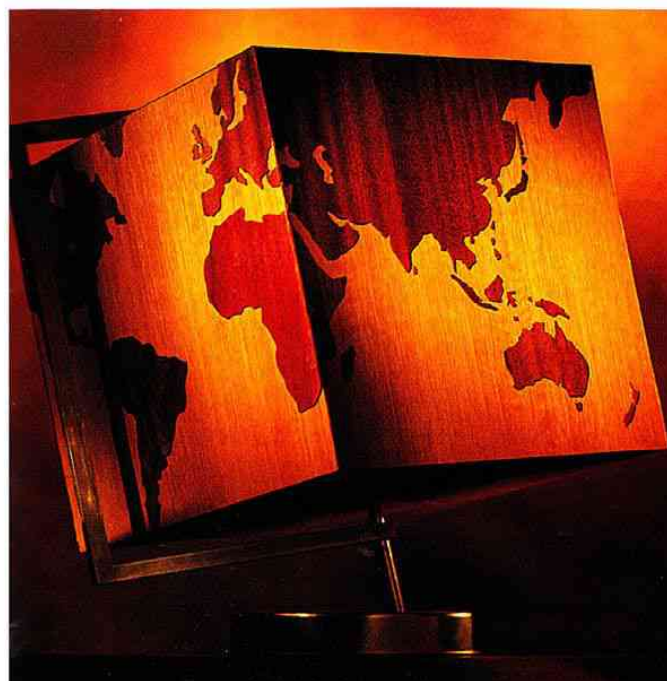
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MATHEWS TIMBER: A FAMILY ENTERPRISE

Sitting in his small but comfortable office, Tony Mathews of Mathews Timber, Victoria taps computer keys to check stocks of timber. 'Yes, we can get that to you by the end of the week', a few more computer clicks and a written order is completed during the course of the conversation which, as always, includes jokes and smiles. Scrawl on a desk calendar indicates the comings and goings of shipments, visitors and trips to Sydney and Tasmania.

The affable Tony Mathews is part owner of the company founded by his recently deceased father. Clem Mathews started the business as a 'one man show operating from home, buying and selling timber in Tasmania'. Since then the company has systematically grown and diversified to include sawmilling, local and overseas timber sales and the machining of turned componentry. Brothers Tony and Greg handle the sales and marketing side of the business whose origins date to around 36 years ago. Managing Director Con Hickey oversees the general running of the mills whilst another of Clem Mathews' sons, Peter Mathews, manages R. Cornall & Sons, a subsidiary company which claims to be the largest supplier of woodturned componentry in the southern hemisphere. The company became part of the Mathews' stable after a large fire burnt the business out at its then Melbourne headquarters in Nicholson Street, Fitzroy. Cornall sold the business to Clem Mathews, whose sons took on the expanding Mathews operations.

Moving into sawmills also seemed a natural thing to do and the company now have a mill in Mansfield, Victoria, two in Tasmania and two in New South Wales in Tumbarumba and Corowa. The mills supply around 40% of the company's sales which comprise Victorian ash and pine. Another

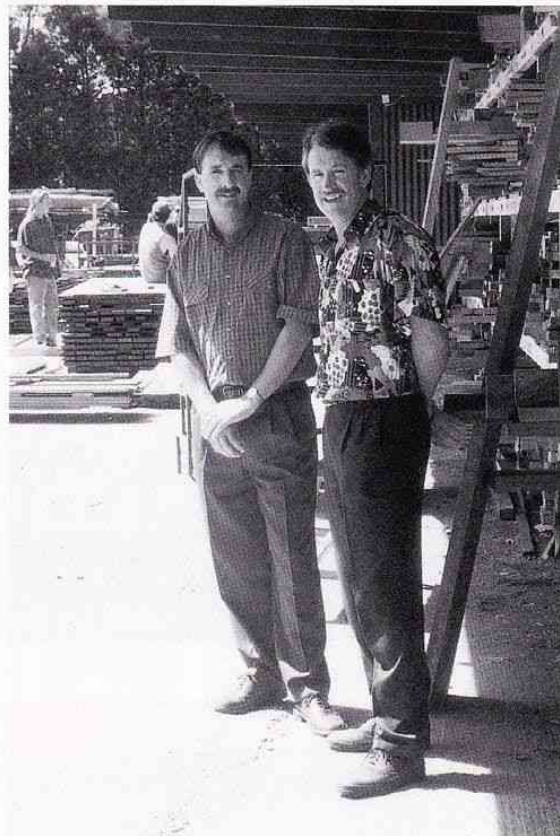
mill in Tasmania specialises in the milling and processing of blackwood which is harvested from farming and private properties.

Mathews aim primarily to supply the furniture and joinery trades, carrying as they do good standard and merchant quality timbers. An estimated 60% of timber sold is imported and includes a large number of species.

One way things will change in the future as regards sales of timber is, according to Tony Mathews, the expectations buyers will come to have of the product. 'You could almost say we've spoilt our customers over the last 20 years with the high grades of clear timbers we've supplied. People will have to learn to be more accepting of the natural variations and defects in wood, and eventually may have to pay a premium for clear grades'.

The timber industry in Australia is certainly ahead in terms of accountability compared to the industries of other countries where new forests are being rapidly opened up. The industry in this country, now has, according to Mathews, one voice and certainly has more awareness of issues than previously. 'Years ago if I were at a dinner party, I would have been more highly regarded if I'd said I was selling drugs rather than saying I was in the timber industry. I mean, we are more aware, even my own kids ask me why we are cutting down trees.'

Despite the heightened awareness, Tony



Greg and Tony Mathews (right)

Mathews feels, in terms of timber usage we are, in many ways, behind the Americans and Europeans. 'Melamine hasn't been used in the US and Europe for about ten years now, not that there's anything wrong with it, but they're using other materials and techniques. Membrane pressing is popular and lower grade timbers are being used as substrates for veneer and timber surfaces for products which are marketed as "solid timber".'

In this country we are now using different timbers for standard purposes. 'Where once we used all meranti for windows and doors we are now supplying hardwood and radiata (Protim-treated or primed) and in some cases MDF. As far as the future goes, we are going to have be smarter, more environmentally aware and attuned to the problems of supply and demand.'

Sales of timber are handled through outlets in Melbourne and Sydney, with most going through the former which carries a greater volume of stock. Containers from overseas arrive every six to eight weeks and juggling orders and delivery times requires skill and a degree of diplomacy. Apart from the actual milling of timber the company does specialise in machining, although boards can be thickened prior to shipping out. Some orders of timber are exported, though this does not account for a great volume of sales.

In recent times the company have been quoting on supplies of timber for the new Crown Casino project in Melbourne which encompasses ten floors of fittings and furniture. Surprisingly, what could have been a show-

piece for Australian timbers will largely be executed in an exotic (and undeniably beautiful) timber, American rock maple.

I like to think that people have a certain amount of passion for things they spend the bulk of their life doing so I wondered if Tony Mathew was also a 'connoisseur' of fine timbers. On leaving, I asked

out of interest what his favourite species were. Without hesitation the reply came: ebony, Indian rosewood, Queensland walnut... and it was evident he could easily have gone on and on. It is somehow still good to know that the success of a company can be due in some part to the enthusiasm and respect its owners have for their product.

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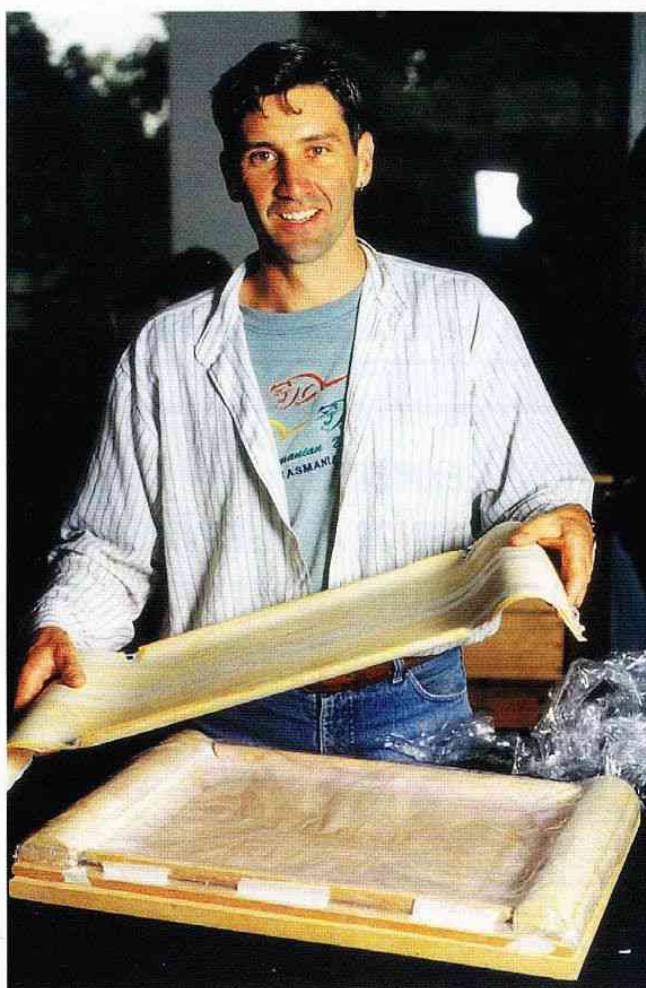
USING VACUUM PRESSING TECHNOLOGY

Being able to form and laminate timber opens up vast new design possibilities. Alan Morris is co-ordinator of the Wood Design course at East Gippsland Institute of TAFE. He writes about the principles and advantages of vacuum pressing technology. A demonstration of the technique is given by one of the students at the institute.

At the institute we have experimented with a shop made vacuum press as well as mechanical methods of pressing laminates. Just over a year ago, however, we invested in a commercially made vacuum press *VacuPress*.

Basically the press is a large vinyl tube which can be closed at both ends with a reinforced plastic hose connected to a pump. The pump extracts air from the bag to create a vacuum which a valve maintains. Within the vacuum the atmospheric pressure of 1,750lb per square foot creates a strong even pressure on laminates and solid timbers. The work to be pressed is placed on a platen of grooved, melamine coated 18mm MDF which connects to the outlet pump hose and sits in the base of the bag.

A caul, which varies according to the shape being formed, is placed over the laminations to achieve a more even pressure. For bends we have used laminating ply and solid pieces of rubber strip or even carpet. For flat laminations 12mm thick MDF board will do the job. No mechanical clamps are needed and if a few correct procedures are followed the machine is capable of producing excellent results in the smallest workshop. Students have embraced the press and pushed its



East Gippsland College of TAFE student Rod McLean with the 'rough' laminates.

limits to make some quite extreme shapes and bends.

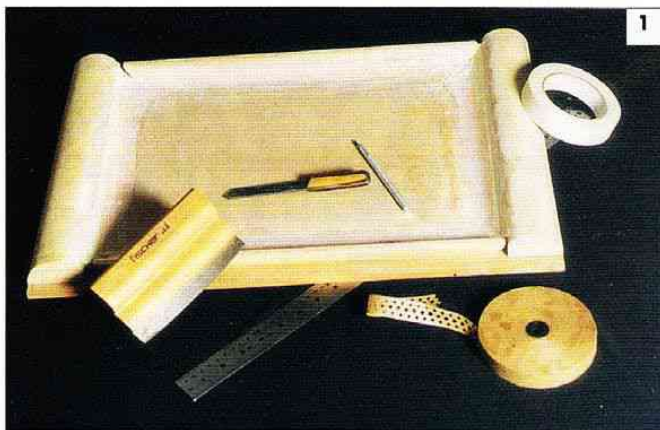
Because the vinyl tube is 2400 x 1200mm wide, several long 'formers' can be pressed at the same time and a number of components, for example chair backs, can then be cut from the one pressing.

We have found from experience that

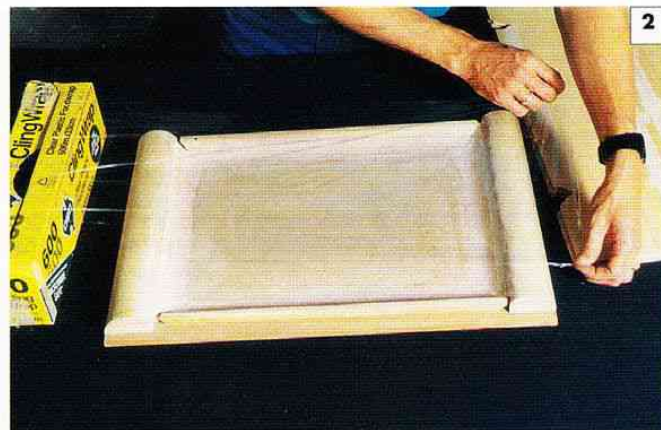
the former itself has to be very strong to withstand the pressure, and can be easily crushed without sufficient support. We have improvised with all sorts of objects, such as steel water pipes, to bend laminates over, and have made up large chair forms. Solid formers are by far the best, but can work out to be expensive for small volume jobs. Ribbed formers covered with ply or MDF are cheaper, but make sure the ribs are close together otherwise the pressure will create a corrugated effect. We cover most formers with a hard plastic laminate which not only strengthens the former but stops excess glue attaching itself to the former while pressing.

The strength and shape of the finished bent lamination depends on the glue. We use urea formaldehyde because it sets hard and reduces the flexibility which can occur with PVA based glues. PVA's are perfectly suitable for flat lam-

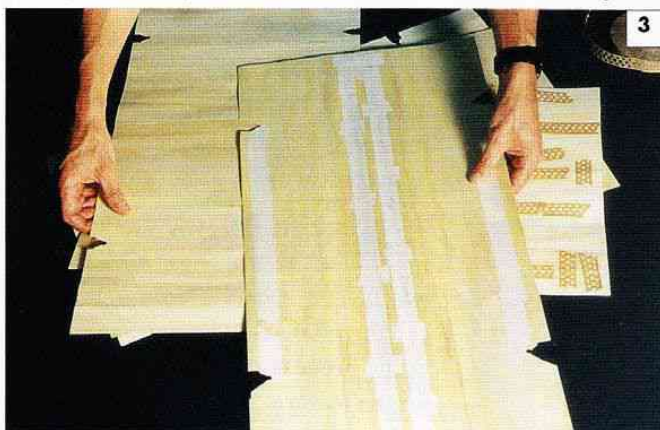
inating. When using urea formaldehyde a clear liquid hardener (as opposed to a brown powder gap filling hardener) should be used with light timbers (and also blackwood) to prevent staining. The pressure in the press is so great it will often force the glue through the pores of the timbers—for this reason we often place clear plastic wrap over



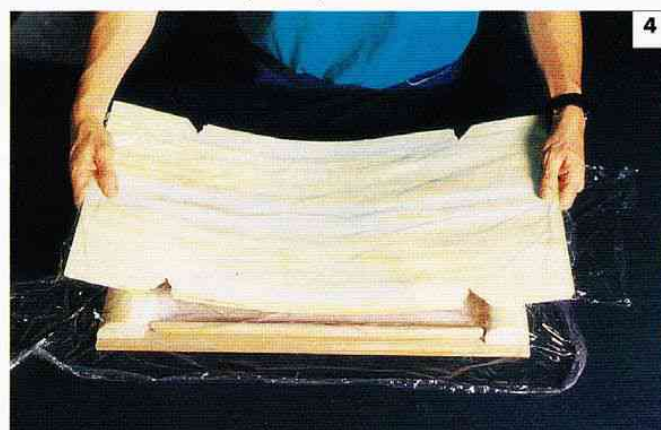
1
The finished former and tools used in making the tray including veneer saw, knives and veneer tape.



2
Joined leaves of veneer with notches cut to facilitate the sharp compound curve in the corners.



3
Plastic wrap protects the former from glue.



4
The layered up veneer laminates are glued and placed on the former.



5
The former and laminates are covered with plastic wrap and placed in the vacuum bag.



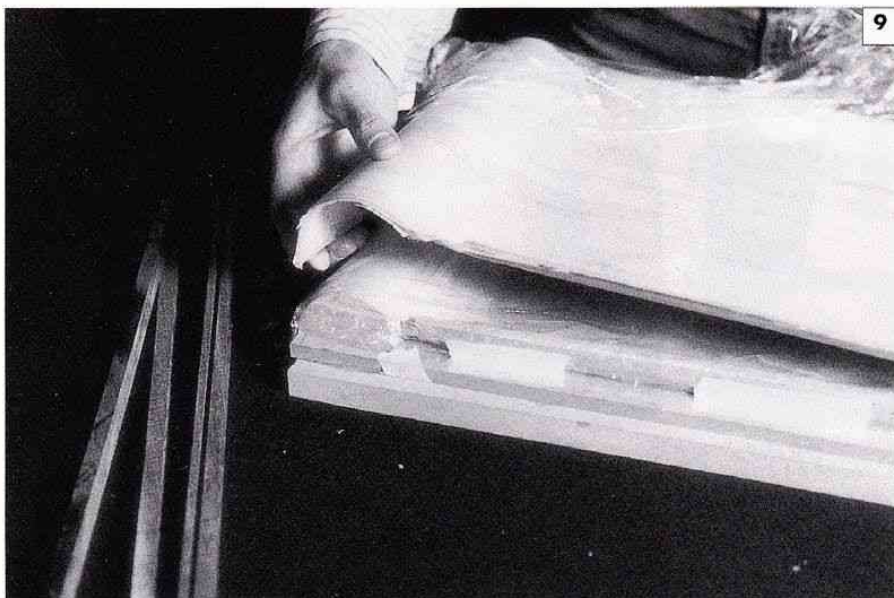
6
A plastic tube seals the bag which is wrapped around. Another split tube is clipped over.



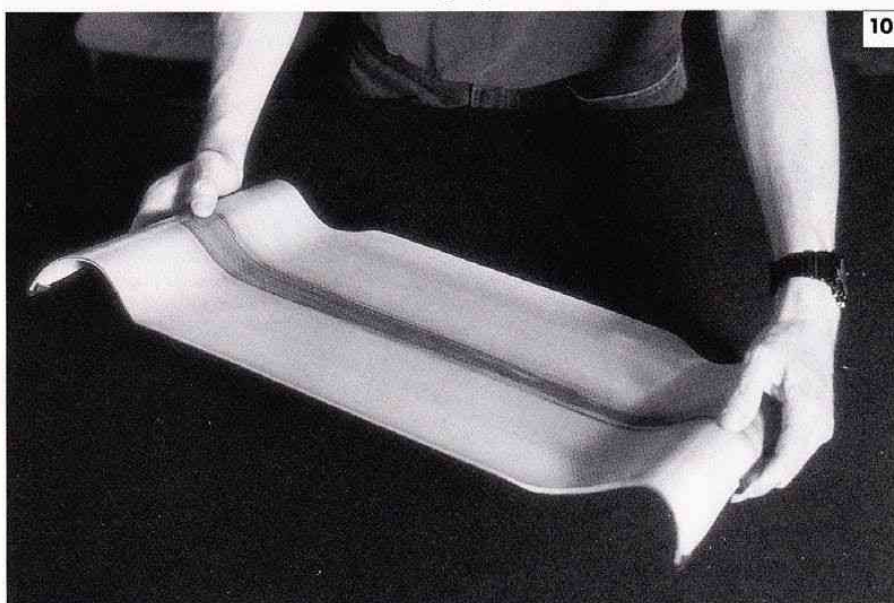
7
Morris and Mclean hold the laminates in place as the vacuum pump is turned on and the bag collapses.



8
The former and laminates are checked finally before being left to harden. The scrap of carpet acting as a caul helps even the pressure on the glued veneers.



9
The laminates are removed from the former.
The sawn hardwood edging is shown on the left.



10
The finished tray made from blackheart sassafras
with gidgee protective edging.

the surfaces for protection.

The flexibility of the vacuum pressing system and its ease of operation have made it a great addition to our workshop and many of the designs in the past which caused difficult clamping operations are now made a lot easier and quicker. This has also encouraged us to save special pieces of wood for veneering and thus conserve some of our diminishing resources.

One of the pieces made recently at the institute with vacuum pressing technology is a tray by second year Wood Design student Rod Mclean.

Mclean tested the limits of tight bends while prototyping a small, simple pro-

duction item which would have minimal labour input.

He explains the process:

1 After working out a design brief for the project I followed a process of thumbnail sketches, resolved drawings and models to the state where I felt the piece had a pleasing line and would fulfil the brief.

2 The next stage was to test veneers for their bending capacity as the handles and edges of the tray were to have a fairly extreme radius. After experimenting with *Arakaria* (hoop pine) core stock at 1.5mm and other veneers at .65mm I found that the finer, straighter grained veneers would take

the tight bend required. Steaming veneers can increase bending tolerances, however I didn't want to spend extra time on what was intended to be a production piece.

3 I had to make a former to bend the veneers over to the shape of the tray. The base was made from 9mm MDF and a turned 60mm cylinder of solid wood was split in two to form the shape of the handle at each end. To form the raised edges of the tray I reshaped some scotia moulding and glued it to the base. Where the scotia and half cylinders met the base I filleted the join with fibreglass filler to make a gentle curve (photo 1). The former is covered with plastic wrap to protect it from glue (photo 2).

4 Five veneer leaves are layed up (photo 3). As a design detail I used two layers of darker coloured veneer and three layers of sassafras selecting in the process the two outside leaves for the feature. The edges were planed and jointed with veneer tape. In this way one pressing only would be needed.

5 Each surface to be glued is coated with a thin even layer of urea formaldehyde using a clear hardener. The layers are placed on a former, covered with plastic wrap and a caul cut from carpet waste. The work is then placed in the vacuum press for four and a half hours. (See photos 4 to 7)

6 After removing the work from the press I bandsaw the edges and shape and saw along the horizontal surfaces.

7 To protect the extreme edges from damage and also to strengthen and stiffen the tray I fit ribs of solid timber. The groove for the edges are cut on the table saw shaped and the ribs glued with epoxy to the body of the tray.

8 A final sanding with 400 grit paper and the tray is ready for three spray coats of a satin two-pack lacquer which gives a good hard wearing surface while retaining the natural feel of the timber.

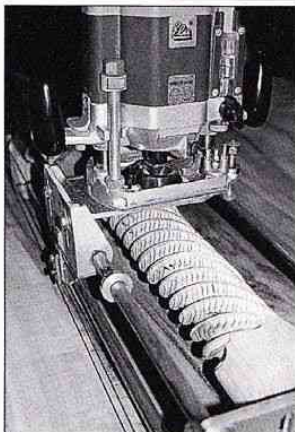
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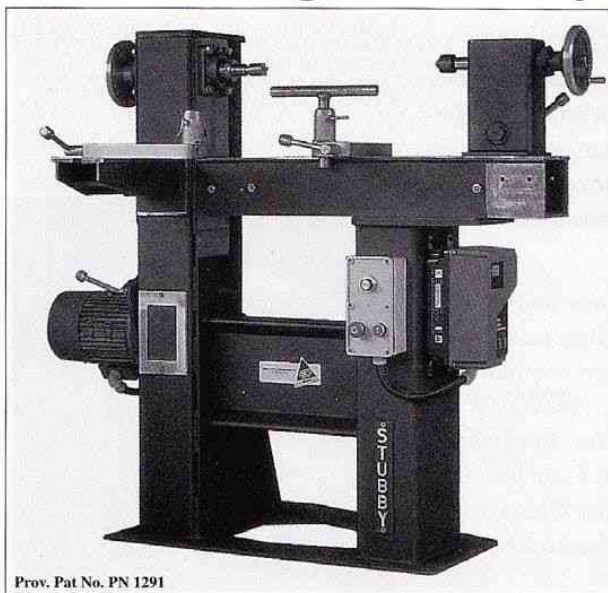
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PRODUCT REVIEWS

FOREDOM WOODCARVER

Carba-Tec, the importers of the Proxxon Minimot 12 volt woodcarving system which I reviewed in Wood Review #6, are now offering a 240 volt system imported from the USA. The Foredom company manufactures a range of powered carving tools which have a lot to offer the serious woodcarver.

The motors, ranging from 1/15 to 1/4hp, can be either suspended overhead or bench-mounted on a swivel base. Cutters are driven through a flexible shaft and a remarkable array of handpieces which offer quick change, angled heads, collets or chucks—all in a range of sizes to accommodate different cutters. Speed is controlled through a solid state foot pedal or bench-mounted dial.

The number and types of cutters available is amazing. For woodworkers they offer vanadium steel, carbide, tungsten carbide, ruby cutters and aluminium oxide, as well a selection of sanding and wire brushing accessories.

With the large handpiece and an aggressive burr bit a prodigious amount of material can be removed very quickly, but with no sign of overheating or labouring from the motor. For lighter work a smaller handpiece can be combined with a finer cutter. Operated at low speed, the most delicate work can be achieved.

I tested the 5240 reversible woodcarving kit with the 1/4hp motor. It comes with all you need to start out, but it is worthwhile considering an extra No.8 handpiece for fine work. It is also a good idea to look at the range of cutters to find those which suit your needs. I counted some hundreds

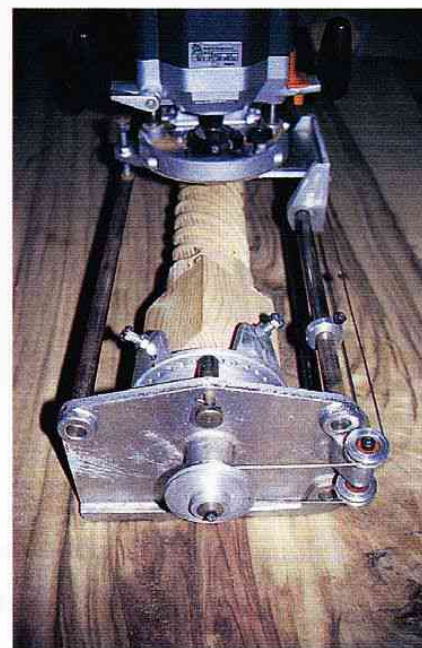


The Foredom 5240 powered woodcarving

in the catalogue and wouldn't mind trying them all. This is the best tool of its type I have ever seen. For the carver or woodworker wanting flexibility with a lot of grunt it is highly recommended.

From Carba-Tec 1-800-653 777.

Reviewed by Terry Martin, woodturner.



The Woodwright Router Lathe

WOODWRIGHT ROUTER LATHE

If you have need to embellish your already turned columns of table legs with either flutes spirals or barley twists, the Woodwright Router Lathe may be the tool for you.

The router lathe is designed to accept most plunge type routers, using the fixing points for attaching the template guide. Held by the grips the router is drawn down the length of the frame. The cradle holding the router is linked by a continuous cable to pulleys which rotate the headstock and hence the timber secured to the body of the lathe. The overall dimensions of the device (1100 x 250 x 150mm) allow for a maximum timber capacity of 900mm in length, and 90 x 90mm cross section.

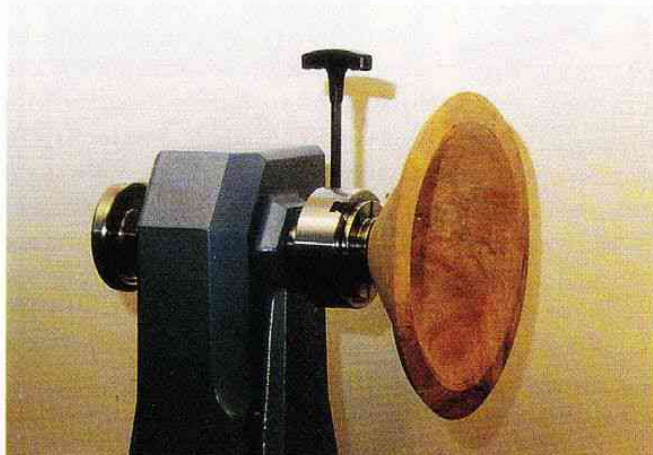
Both left and right hand spirals, as well as longitudinal flutes or circular beads, can be cut by simple adjustment. The headstock has a 36 hole indexing plate to facilitate these operations. The height of the tailstock pin can be adjusted so that the top of the job can be aligned parallel to the router cradle to allow uniform profiles to be cut on tapered sections.

The job is secured to the headstock by adjusting four bolts on the support housing to the top section of the work and thus allowing either round or square profiles to be secured. A choice of three spiral pitches can be produced by three pulley diameters at the headstock end. It would be relatively simple to change the pulley to allow for other options.

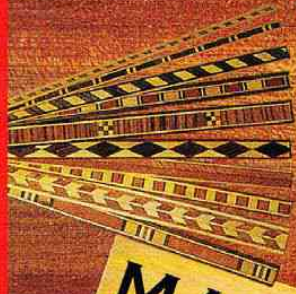
A variety of finished work can be achieved with the use of different router cutters and with imaginative selection of alternative speed/feed ratios. The unit is by no means the 'prince charming' of devices but could suit the small manufacturer or home woodworker wanting to add a special touch to their turned components. Contact Woodstock Timber Tools & Hardware (09) 345 4522.

Reviewed by Charles Sale, furniture maker.

The new VM120 chuck from Vicmarc Machinery.



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NEW VICMARC CHUCK

The market for woodturning chucks in Australia is very competitive and the most popular and versatile are four-jaw scroll chucks. Two Australian manufacturers and two from New Zealand compete for both the local and overseas markets. Vicmarc Machinery has been a major producer for some years and their small VM 90 chuck and the larger VM 140 are among the most popular on the market. Now they are producing a new chuck, the VM 120, which is a big challenge to other manufacturers.

Until now all of the Australasian scroll chucks have been operated with two tommy bars. Although they work well enough, there are some disadvantages. If the spindle can't be locked off, for example by the use of the indexer, it requires the use of two hands to operate the chuck. If the spindle can be locked it is possible to operate the chuck with one hand and hold the work with the other, but the temptation is to tighten the chuck by working against this spindle lock. Frequently the chuck becomes screwed onto the spindle harder than necessary and requires hard work with a spanner to remove it.

The VM 120 is based on the conventional engineering chuck and it has none of these problems. The jaws are operated one-handed with a T-handled Allen key, so the other hand can hold the work aligned and steady while the

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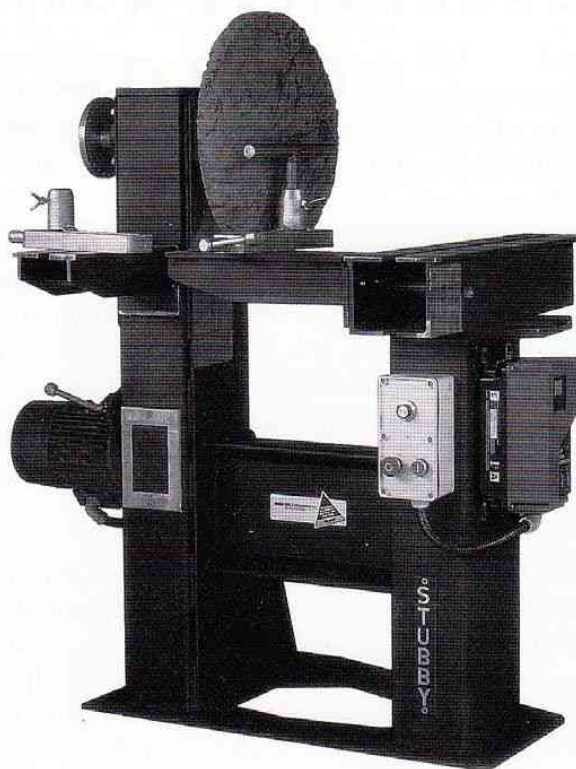
jaws are tightened. Its gripping power is considerable and there is no problem with tommy bars bending or bar holes being enlarged through constant use.

The chuck is 125mm in diameter, falling between the two previous models, and it weighs 38kg fully boxed. If you already own a VM 140 chuck, the accessories are fully interchangeable. The chuck has the familiar robust feel of all the Vicmarc products, while the use of CNC technology in their manufacture should ensure accuracy and quality control. Now I am looking forward to a similar version of the VM 90. Available from Vicmarc Machinery (07) 3284 3103. Reviewed by Terry Martin

OMEGA 'STUBBY' LATHE

'It's beautiful. Smooth and quiet, easy to adjust, it's a pleasure to use' effuses Michael Buultjens, Holmesglen Institute's woodturning instructor. Holmesglen in Victoria has four machines, and of all the lathes in the workshop, they are always the first to be used by students and staff alike.

Australian designed and made, Omega's 'Stubby' is the most radical development in lathes for many years. The machine bed can be extended from 450mm to almost a metre for centre turning. With the bed closed you can turn up to 400mm diameter on the faceplate. With the bed opened diameters up to a whopping metre can be turned. This is all inboard turning, with no need to mount the work on the end of the lathe, or to use reversing spindles, left hand threads or additional cost outboard turning attachments. Outboard turning (of almost 800mm) is also possible.



The Omega Stubby lathe.

The machine comes equipped with a two speed belt drive, and a potentiometer for an infinitely variable spindle speed of between 200 to 3000 rpm. You also get a reversing switch and a 2hp (1.5kw) motor. The base of 600mm is twice as wide as other similar capacity machines, and with some of the parts now being cast, the machine is cheaper than before.

The stubby certainly outclasses most other lathes in the features department. It only takes a few seconds to extend the bed to almost a metre, and here my only criticism was that it can be difficult to extend fully because of the sheer weight of the bed (the manufacturer claims this problem will be eliminated in all new machines). The machine offers a large capacity with a very short but wide footprint. It's so massive that a twenty cent coin stood on edge on the running machine will not fall over! All adjustable parts are locked by cams, and the toolrests are all the round bar type. Made of BHP steel, the 'Stubby' looks the part and is guaranteed to please.

Reviewed by Philip Ashley, Machinery Technology Editor.

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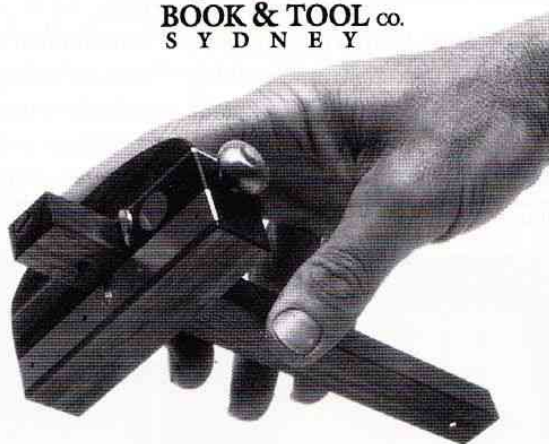
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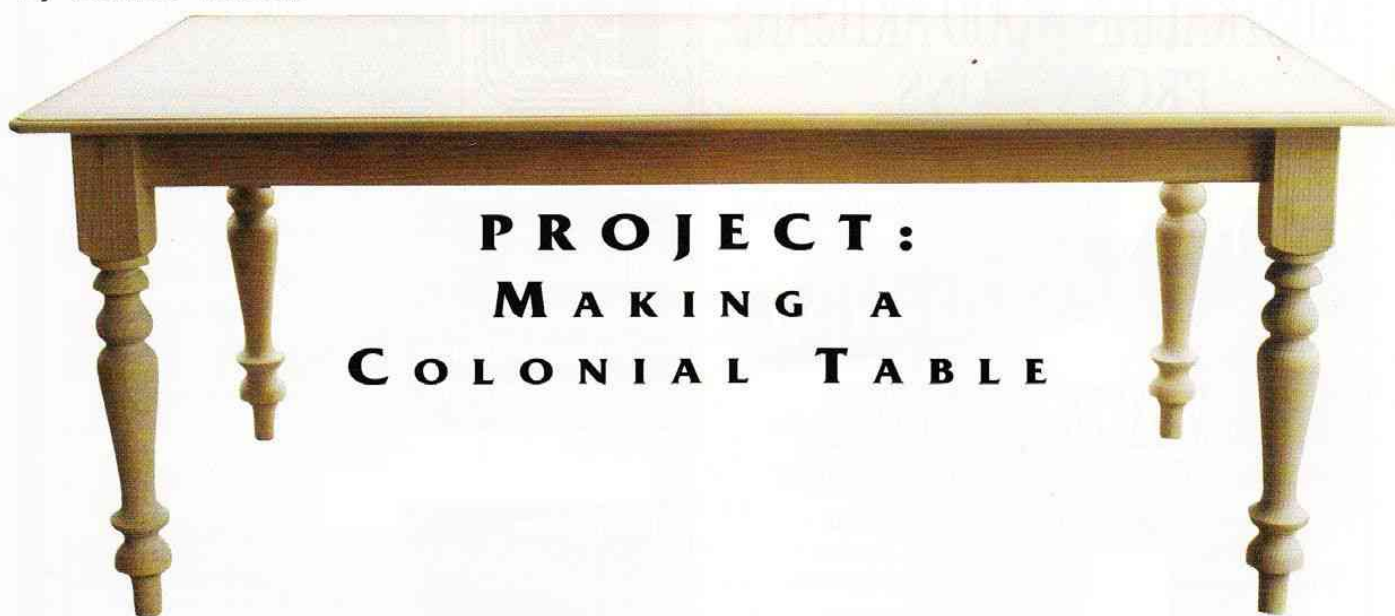
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PROJECT: MAKING A COLONIAL TABLE

There are many people out there today making furniture. Some makers don't have formal woodwork training and don't know some of the basic principles of construction. Joining a table rail to a leg is one area where some people literally come unstuck. In fact I have seen some remarkable variations of this joint which may initially appear strong but are guaranteed to come apart in time. Joining solutions such as angled screws, truss brackets and nails are simply not professional.

This project is dedicated to those who want a fast and simple table making method for the cheaper end of the market, but still want to maintain basic structural integrity. Whilst my personal preference in furniture is for

contemporary design there is no escaping the fact that by far the bulk of the furniture buying market prefer reproduction style furniture. One of the most popular styles of table sold throughout the country is the 'colonial', marketed under various names such as country, farm-house, cottage, hand made, Australian, Baltic and antique.

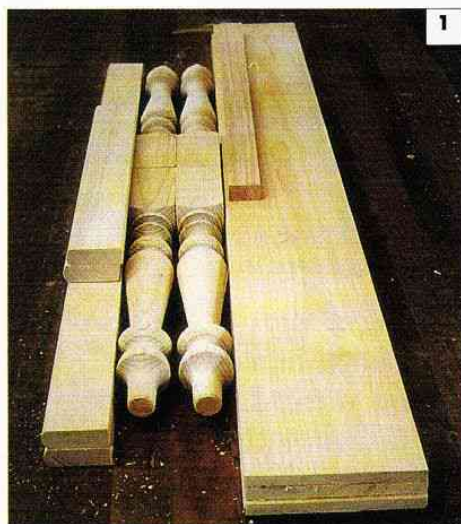
These tables feature turned legs, rounded corners and a bull-nosed edge. The timber used is mostly some sort of pine, be it radiata, hoop or Baltic. The colonial table is commonly stained a warm honey colour usually labelled 'Baltic'. Common top sizes are either 1500mm x 910mm and 1800mm x 910mm. Prices vary from \$650 to \$1000—and they sell. This project also

illustrates another technique discussed in this issue, namely dowel jointing.

There are real colonial tables of course and, as I understand it, they date from the 1800s onward, and were made from local timbers such as red cedar, hoop pine, huon pine and kauri pine or from imported Baltic pine. For this project we are using radiata pine legs and hoop pine (Arakaria) for the top and rails.

LEGS

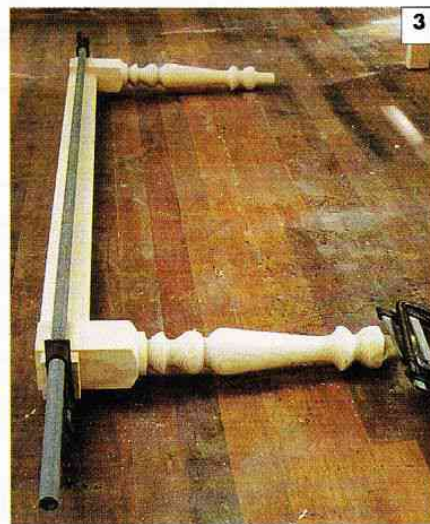
The legs were purchased 'off the shelf' from Prestige Timbercraft who source them from R. Cornall & Son. These legs are turned from 90mm x 90mm timber and need to be docked to 710 to 720mm long.



1



2



3

All the timber you need for the table. Legs and rails are drilled for dowels.

Long sides in clamps, clamps on near leg are to help remove slight twist.



Short rails being glued in. Use two cramps for each rail to spread the pressure more evenly.



Table frame showing glue blocks and centre rail.

RAILS

The rails are dressed to 90mm x 32mm (90mm x 19mm rails are also used by industry to keep costs and weight down, although I feel hardwood is better for thinner rails to maintain strength). Dressing your own timber or buying pre-dressed stock is a personal preference, the main point is to have straight stock! In this case I bought dressed timber. We are making an 1850 x 910mm sized table so cut the long rail lengths to 1520mm and the shorter end rails cut to 650mm.

LEG JOINT

The joint between leg and rail can be a mortise and tenon (which is stronger and preferred) but for the purpose of this exercise we will be using dowels. With a marking gauge I scribe the middle on the end of one rail and mark off evenly for three dowels. As we are using 32mm thick stock I will use 11mm diameter dowels. For 19mm stock you would have to go for 9.5mm dowels, but there is then quite a trade-off in strength so I would not recommend them other than for a coffee table.

I drill the dowel holes on a morticing table which has depth and side stops that allow for easy drilling repetition. Check the dowel and drill bit for compatibility, sometimes an 11mm dowel may need a 10.75mm hole for a snug fit; sloppy dowel holes give a weak joint.

Drill holes for the dowels in all the rails and legs. The dowels I use are 62mm long (photo 2). After drilling, sand the square sections of the legs and the rails. I normally sand with 80, 100 and 120 grit on the belt sander and leave final sanding till after the whole table is assembled.

GLUE UP

First I glue up the long sides. Have an area and your clamps and blocks (for protecting legs in clamps) ready before squirting glue into the dowel holes. Tap in the dowels, spread glue on the end grain and join the long



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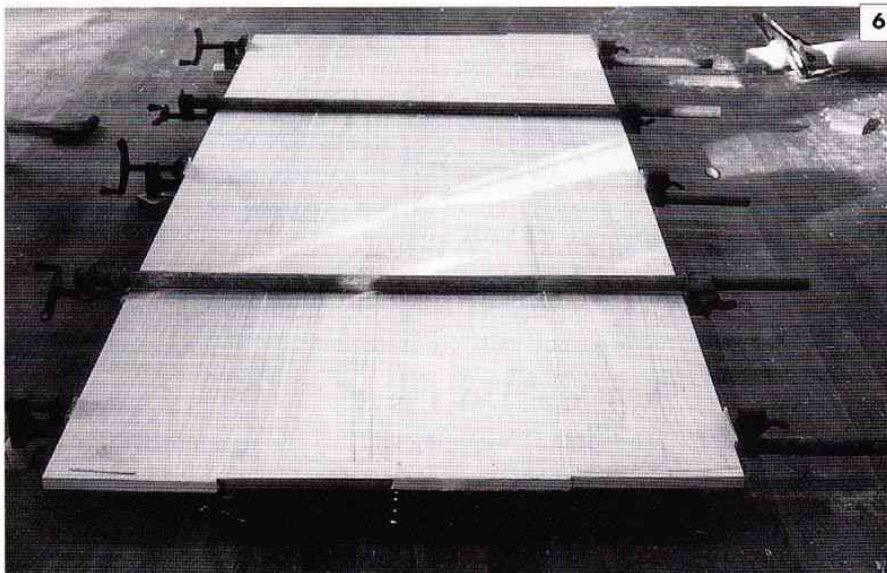


Table top being glued up.



**Top and frame secured with screws and steel clips.
Note glue block with four screws and glue.**

rails to the legs. Check that the legs are facing the correct way. I use two clamps on each glue up. Check for twist and squareness, leave the whole to dry overnight (photo 3). Next, glue up the short rails to complete the table frame. Again check for twist and squareness and leave the table frame to dry overnight (photo 4).

STRENGTHENING THE FRAME

I always use large corner glue blocks for added strength. Cut 80 x 32-42mm blocks and glue and screw them in place. For quality work I feel it is best to add a central cross rail in the table frame. This makes the table top more rigid and stops the long rails

from bowing. For a central rail cut a section 80 x 19 or 32mm and biscuit join this into the long rails (corner glue blocks can also be added to this central rail). I then use a biscuit joiner to cut grooves to receive the steel table clips which secure the top to the frame. You can also secure the top with wooden clips as described by John McLennan in 'Designing Tables' in the last issue of this magazine. Next, remove glue spots, final sand and detail the table frame. Break edges and round the outside of the leg edge. Level off the rails with the tops of the legs (photo 5).

THE TOP

Wider boards always look better for

the top although you will be limited by the timber available to you. For this project I was able to purchase 235 x 19mm hoop pine which, after jointing the edges and trimming, came down to four boards 227mm wide each (I leave these longer than needed at 1900mm). This then gives me a top 910mm wide with length that can be trimmed after gluing.

The joins between boards obviously need to be as perfect as can be achieved. I joint the edges on the planer and then I like to hand plane the boards to create an extremely slight hollow in the length. We are chasing a tight fit on the ends and the hollow will guarantee this. With a biscuit joiner I cut five grooves in each join; the biscuits align the boards and save time later when sanding.

Always look at the boards in relation to each other. Playing around with grain matching can make a huge difference to the final look of a piece. For the actual glue up I use five cramps, three underneath and two on top, and check for flatness and twist. Once again leave to dry overnight (photo 6).

After removing the clamps I sand the underneath of the top first and then trim to the desired length with a portable saw and batten. Cut the top to 1850mm long making sure that you don't expose a biscuit on the end grain. Flip the table frame upside down onto the top and, with steel clips in the grooves, screw the top and frame together (photo 7).

Now that the top is secure I first rough sand the top with the belt sander to 80 grit, and then remove the square corners with a jig saw. Continue sanding up to 120 grit. With a rounding over bit in the router, round over the top edge and then continue sanding by hand up to 220 grit. Ensure there are no sharp edges on the underneath edge of the top. The table is now complete and ready for polishing.

Next issue we will look at applying a distressed finish.



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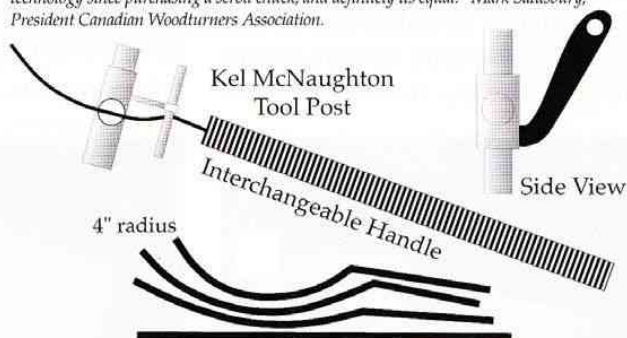
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PROJECT: A WINGED VESSEL

Often the only way to obtain good quality timber is in long lengths sawn for cabinet making or other straight-line work. If you want to use it for turning, there is an inevitable waste of timber as the corners are cut off on the bandsaw, or the shavings pile up under your lathe.

You can often charge more for larger woodturnings, as people like to feel they are getting a lot for their dollar. I used to be very frustrated when I

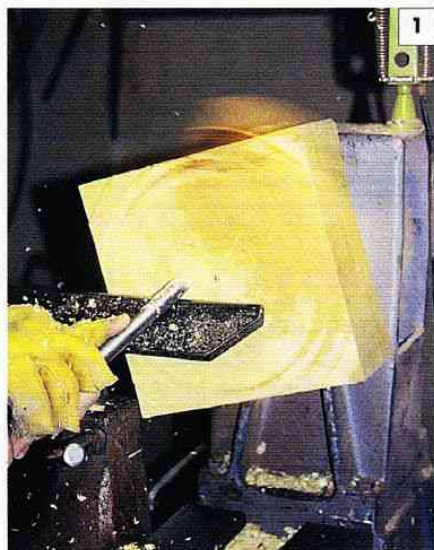
obtained a piece of timber, say 300 mm square. The diagonal measurement, from corner to corner, was around 430 mm and I wanted to utilise that extra wood instead of mulching my garden with the waste. Square-rimmed vessels were pioneered by Vic Wood long ago and have been much imitated, so I wanted a new idea. The result is my winged vessels, which are larger than simple circular cutting allows.

This project starts with a piece of

huon pine 200mm square and 100 mm thick. Draw diagonal lines from corner to corner on one face to find the exact centre, drill a hole and mount the blank on a screw chuck. It is possible to use a small faceplate, but for this size I find a quality screw chuck secure enough.

SAFETY FIRST

There are a few important rules for turning out of round pieces:



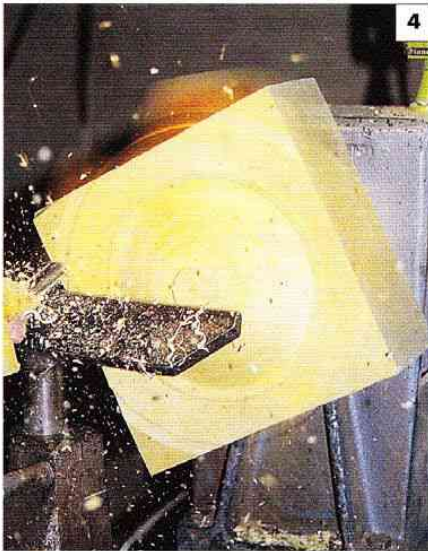
Truing up the base.



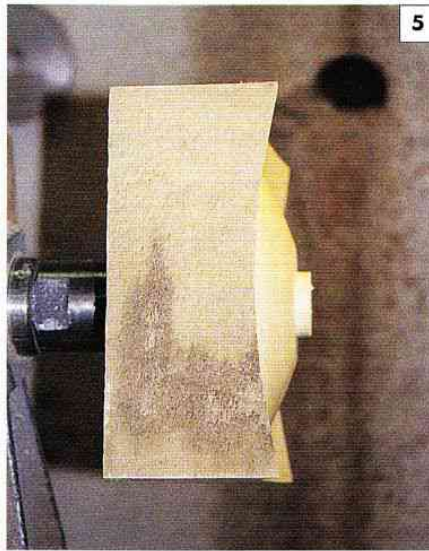
Marking the spigot diameter.



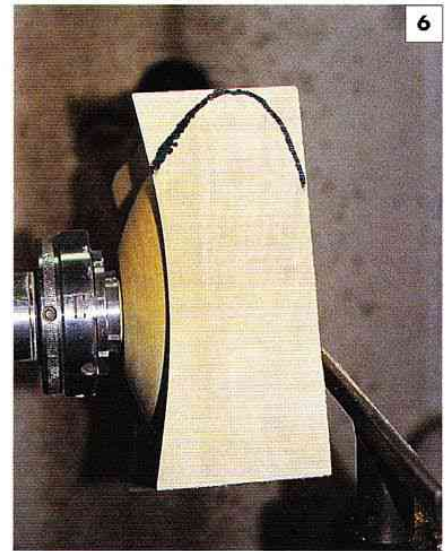
Cutting away from the base.



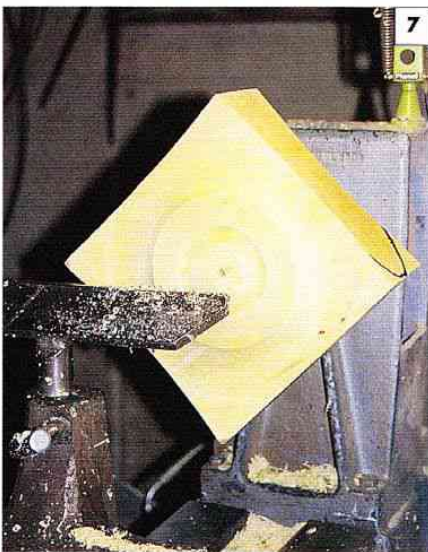
Cutting inward from the corners.



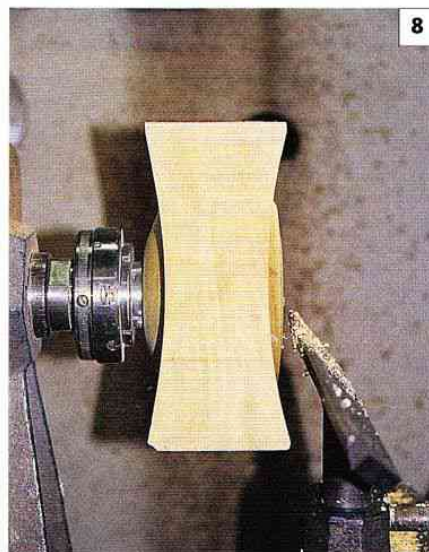
The finished base.



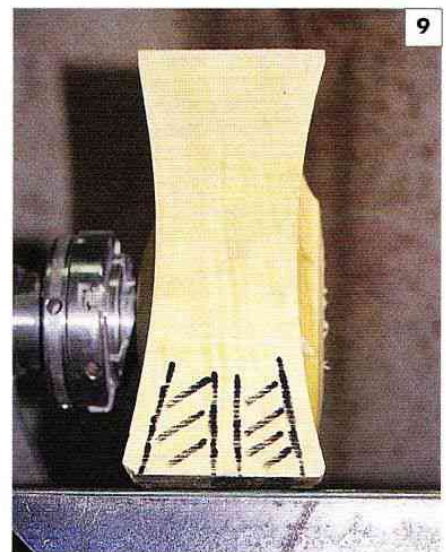
The imaginary line.



The marked opening and rim.



Top and bottom curves blended together.



The shaded areas to be cut out.

1 The speed selected should be as fast as you can go without vibration. Cutting will be intermittent when the corners are passing the tool. A faster speed means that cutting will be more continuous—ie 'cutcutcutcut' not 'cut...cut...cut...cut'.

2 Position the toolrest as close to the work as you can. *It is important to always rotate the work 360° by hand to be sure that no part of the work contacts the toolrest (this applies no matter what you are turning).*

3 When cutting you should draw an imaginary line parallel with the toolrest and extending far longer than its length. **No part of your hand or body should cross that line.** As long as all of you is on the opposite side of the toolrest to all of the work, you'll be safe. Just keep that invisible line in your mind

and remember that the spinning corners of the work will be invisible. A flexible lamp is very useful here as it can be angled across the work to give a solid view of the spinning corners.

METHOD

1 True the base of the blank, concentrating on the centre where the spigot will be cut (photo 1). It is not yet necessary to cut the corners. Next mark the diameter of the spigot. As I am going to remount this piece in a Vicmarc VM90 chuck, I only need a small spigot. To give the best grip and avoid uneven crushing of the spigot (which can cause it to snap off) make sure the chuck is set so the jaws are circular. On most scroll chucks this position is found with the jaws slightly open. I use a pair of dividers to transfer this diameter to the base of the blank, making

sure that only the left hand leg of the dividers is in contact with the wood and on the rest, ensuring there is no catch (photo 2).

2 After shaping the spigot, cut away from the base as if starting an ordinary bowl. Stop at the point where cutting begins to be intermittent (photo 3). Then cut inwards towards the centre of the piece leaving the tips of the corners intact so the curve blends in with the first outward cuts (photo 4).

The reason for cutting in this direction is that an outward cut may pull the corners off the piece. During this intermittent cutting it is important to maintain downward pressure on the tool rest so the gouge does not jump around as it contacts the work. In this kind of cutting the old rule of keep the bevel rubbing is not only inappli-

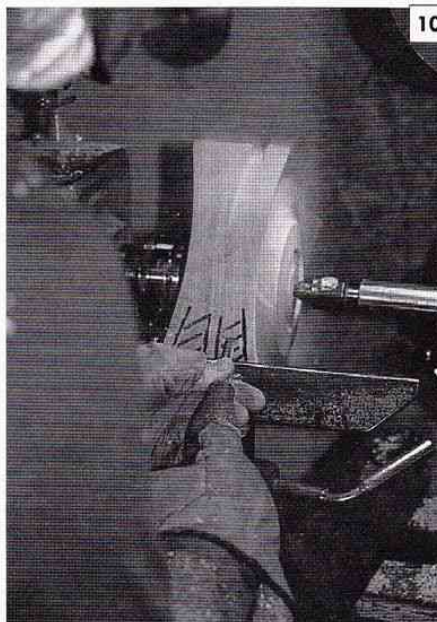
cable, it is actually impossible. The aim of the last stage is clearer in photo 5, which shows the finished cut. The two curves have blended into each other and there is an impression of a bowl imbedded in a block of wood.

3 Next, turn over the piece and mount it in the chuck. If you are worried that the spigot is not strong enough, you can run a line of superglue around the base of the spigot and let it harden before you put it in the chuck. The glue will penetrate along the grain and make the spigot rock-hard. It may help to draw a line on the outside of the block to illustrate the imaginary vessel you are shaping (photo 6). Although you will not actually cut most of this curve, you need to blend the top and bottom of the vessel into its line.

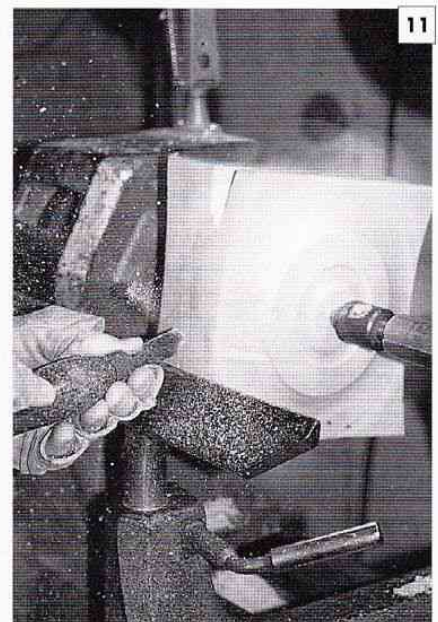
4 The size of the vessel opening is decided in this case by the 100mm sawtooth bit I am going to use to start hollowing. Having marked the opening, cut a flat rim around this opening (photo 7). Then cut the rest of the top in the same way as the bottom, again ending up with a balanced curve (photo 8). The balance of top and bottom is clear and the imbedded vessel is starting to take shape.

5 Next, draw shaded areas on the square edge of the blank to indicate where the wings will be cut (photo 9). If the light is positioned correctly, the shading will appear to be continuously in view while the piece spins. It will then be easy to accurately make the cuts (photo 10). The tailstock can be brought up for extra security at this stage. Again taking care that the toolrest clears the work, I use a parting tool in a horizontal position to plunge cut into the spinning corners and remove the shaded areas (photo 11).

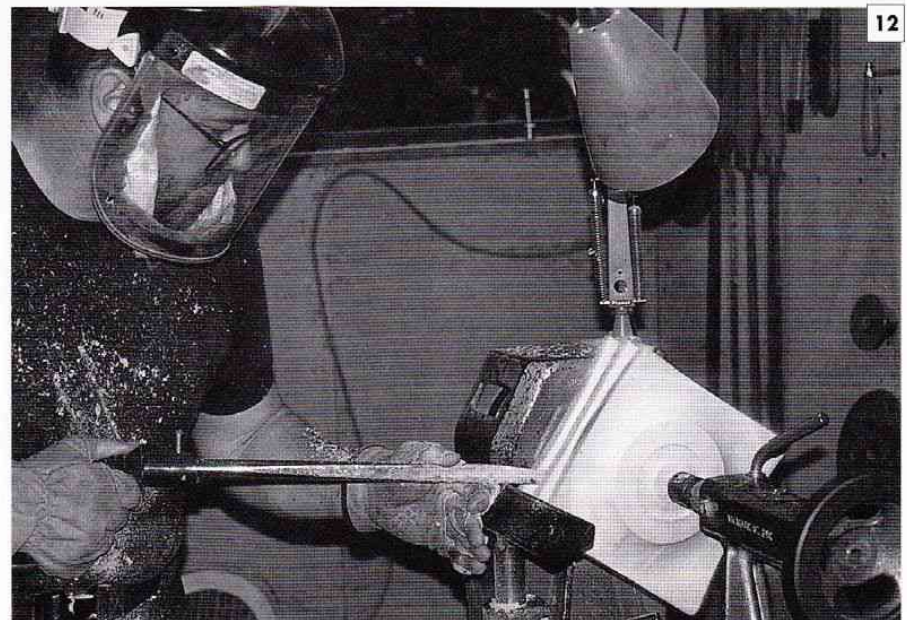
If you are not confident using a parting tool at this point, you may feel more secure using a longer, heavier tool such as a Stewart system slicer (photo 12). After the grooves are cut to the point where the tool is cutting continuously, sight over the top of the spinning work and blend the curve



Shaded areas visible as work spins.



Cutting with the parting tool.



Cutting with the Stewart tool.

into the imaginary line that runs from the base to the top (photo 13).

Because I am going to texture the surface of most of the vessel, I am not worried about a fine finish. Part of the reason is that it would be practically impossible to sand the out-of-round portions of the work.

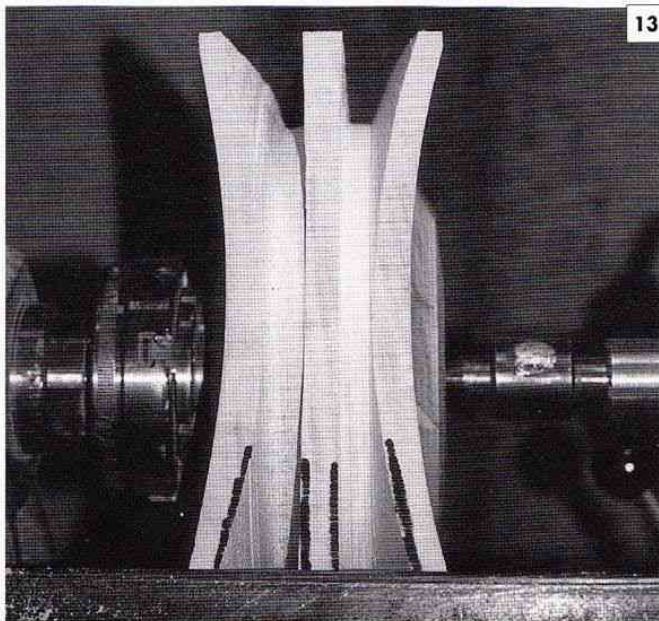
6 When the shape is satisfactory, mark a circle on the top at the widest diameter of the vessel, then mark the wings (photo 14). You have the option of leaving four wings, but I find that two are less busy to the eye and give a pleasing curve.

7 Next cut away the unwanted parts

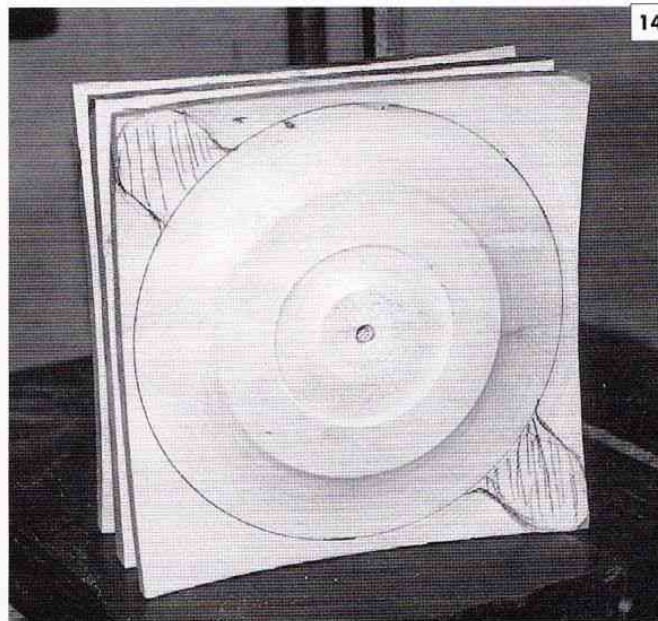
of the rim on the bandsaw (photo 15). To refine the curve of the vessel wall where I have cut away the rim, I hold the vessel and sand freehand against a belt sander.

8 When the outside has been shaped, the vessel is remounted in the chuck to leave hands free for the next operation. At this stage a Black and Decker Powerfile, or similar small, hand-held belt sander can be used to further refine the outside wall.

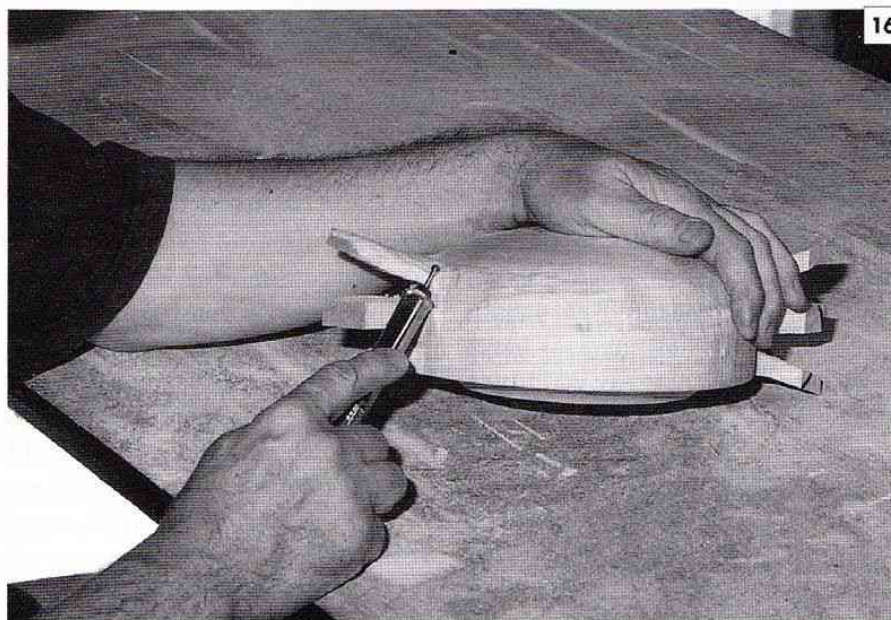
I start hollowing with the 100mm sawtooth bit, which removes a massive amount of wood very quickly. Then I finish hollowing with the Stewart system hooker



Sighting over the top to refine the curve.



The wings and diameter marked out.



Above left: Cutting away the excess on the bandsaw. Right: Shaping with the Foredom carver.

as described in Wood Review #6.

After hollowing is complete I sand the interior and rim to give a smooth contrast to the textured surface of the rest of the vessel. I can then either reverse-mount the vessel and turn off the spigot, or plane it off and sand the foot.

There is no reason why the hollowing can't be done at an earlier stage before the bandsawing so the piece doesn't need to be remounted. I simply find it easier to use calipers to check the wall thickness with most of the rims removed.

I usually use a Foredom Woodcarver

(reviewed this issue) with a tungsten bit to refine the wing shapes (photo 16). There are other systems that will do the same job, or if you don't want to buy a powered rotary cutter it is possible to buy a flexible drive shaft that can be driven from your lathe with a Jacob's chuck. If you are a glutton for punishment you can do the whole job with rasps and sandpaper.

9 After I am happy with the shape I use a small ball-shaped cutter to texture the surface. This is done by repeated taps with the bit on the surface until the whole is stippled to a uniform texture. It is important to cut with the grain or a furred surface will result.

10 The final surface can be lightly buffed using a nylon rotary brush or a cloth buffer mounted in the lathe. This will remove any left-over furry bits. I prefer a wipe-on, wipe-off Penetrol finish as the textured surface doesn't work with all materials. A spray finish would also work well.

The result is an exotic winged vessel and the extra work has added value while saving timber. I encourage you to look at your turning blanks and think before you cut off any supposed excess. Maybe you can add a lot more value with some lateral thinking and extra work.

By Bob Howard

ON TECHNIQUE: WHAT IS IT AND HOW DO YOU GET IT?

Marking towards yourself rather than away is more comfortable, and there more likely to be accuracy.

I have spent a good part of the past five years teaching woodwork. As most teachers probably find, I have learnt as much as my students have. In fact, I am moved to say that if you seriously wish to learn, for example, how to cut a better dovetail, the most efficient way to improve yourself is to attempt to teach someone else how to do it. The great thing about teaching is that you are quickly forced to confront a lot of things that you otherwise might easily ignore, avoid or simply be unaware of.

In order to teach someone how to cut dovetails, you need to work out a procedure. Just about any book on woodwork will give a version of this. If you follow the recipe of a how-to book, you will end up with a dovetail at the end, but chances are it won't be a really good one. So what have you done wrong? Usually you will look in vain for the equivalent of the troubleshooting guide common in car manuals: 'if you have an even gap under all the tails, check the following...'

When you start to look for what you have done wrong, you will eventually also start to think about how you might

go about the work so as to minimise the chances of that mistake happening again. Once you start doing this you have entered the world of *technique*. This will encompass the way you choose, use and prepare tools and wood, which work methods you adopt, how you organise your workspace, and even that fathomless world of mental attitude (Robert Pirsig, in his marvellous book *Zen and the Art of Motorcycle Maintenance*, began: 'Assembly of Japanese motorcycle require great peace of mind...')

Over time, as we work we build up a collection of knowledge, procedures, tricks of the trade, mental notes, methods of working, hard experience and so on, as well as a level of skill with our tools. If we are disciplined enough, all this adds up to a particular way of working, our own individual approach to doing the various woodworking tasks that confront us. It is this that I refer to as our technique.

There are three things that need to be said immediately about technique. The first is that technique is something that evolves. You can begin with a technique that you learn from some-

one else. This was the old way, where apprentices learnt from their masters and, by doing so, stood on the shoulders of all those who had gone before them. Your technique will evolve from this point as you learn by trial and error or by interaction with your peers. It will also be affected by changes in technology in tools and materials.

Secondly, the technique that is best for you will depend on your level of skill. In the beginning you will need a technique that is safe but probably slow. As your level of skill rises, you will be able to do safely things that were previously too risky, so your technique can be adjusted accordingly.

Finally, and probably most importantly, the best technique in the world is utterly useless if you don't use it. In other words, technique has to be accompanied by discipline, and in my experience as a teacher, this is the bit that separates the best students from the rest. Once you evolve a successful technique, you need to use it *all* of the time.

Modern sportspeople pursue excellence with a passion that is probably unrivalled by any other people in the world.

Where is the woodworker who gets up at 5.30am to cut ten dovetails before breakfast? Or the one who practises basic woodworking skills for two hours every afternoon? Sports coaches have long twigged to the importance of honing basic skills until they become automatic, so they will stand up under pressure. They spend hour after hour, using highly sophisticated equipment, analysing technique, seeking better ways or probing for weaknesses. Pity the poor cricket batsman who has a deficient defensive technique. By the time he gets to the crease his opponents will have set a field and planned a bowling attack carefully designed to exploit his weakness.

If you watch someone like Greg Norman play golf you will get a lesson in the importance of technique and discipline. He uses the best equipment to give himself the best chance of success. Then he plays every shot, no matter how easy it must be for a player of his calibre, as though it was the most difficult shot he has played all day. You will not see a single careless or casual move. You will see focus, concentration, and discipline. And a level of skill that is the result of a certain amount of innate talent mixed with an enormous quantity of sheer hard work.

We too can develop exercises that we can do every day to hone our basic skills, just as musicians practise their scales. You might, for example, take a piece of 50 x 25mm wood, square a line around it about 5mm in from one end, then take your saw and cut it off, trying to split the line on all four faces. It is important when marking, that the end of the line meet exactly the beginning. These tasks need to be practised until they can be done routinely.

As you struggle with them, you will evolve your own technique for doing them. This might include some tried and true elements, such as always working with the square from one reference face and one reference edge. Other things you might work out for yourself, such as always rolling the

wood away from you as you move to transfer the line from one face to the next. This ensures that you are always marking from a far face towards you, which is much more comfortable, and hence more likely to be accurate, than working from the near face and away from you.

It is worth remembering that the technical side of woodwork is ruthlessly logical. The wood doesn't care whether or not you are a good or bad person, or how much you deserve to succeed. There is no room for wishful thinking, for just hacking away in the hope that it will be alright at the end. Once you accept the reality of this logic, you can turn it to advantage. If a joint is marked out accurately, and cut accurately, then it must fit. Logically, this must be so. The reverse is also true: if it is not marked out accurately, or not cut accurately, it won't fit. How much care do *you* take to make sure your marking out and cutting is as perfect as you can make it? And if it isn't how do you expect to get the result you want?

If it doesn't fit find out why. I hate to think how many times I have had to help puzzled students understand that the reason the joint won't close up is because they have left a whopping great splinter of wood in the corner of one half of it, or that they do not have two flat surfaces coming together, but two rounded ones.

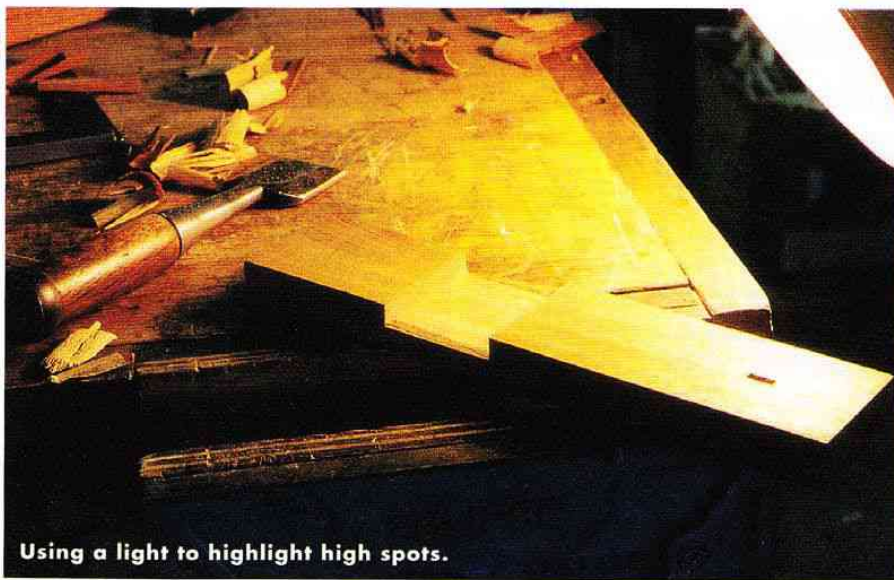
When you do start thinking about your

work you are well on the way to developing a good technique. Inevitably you will develop a feedback loop. If you make a mistake once you might be content to dismiss it as carelessness. If you make it twice, especially if you do so in spite of your most attentive care, you will start to think about ways and means of changing your technique so as to make it impossible for that mistake to ever occur again. Over time you will tighten your technique until you can routinely produce excellent work.

It is important to realise, too, that this process needs to cover the entire range of factors that affect our woodwork. We need to pay attention to our workspace, our tools, and our raw materials because these are all important parts of comprehensive technique. Remember that good technique is all about maximising the chances of success, and minimising the risk of failure. It should be obvious that the quality of our workplace, tools and materials will contribute to this.

With simple common sense we can increase the quality of our work. Technique is a very real issue to think about. Over the past few years I have watched a lot of different people work, and I have been driven to wonder why it is so easy for some and so terribly difficult for others. Technique is not a complete answer to that question, but I am sure it is an important part of it.

Bob Howard is a cabinetmaker and woodcarver in Alexandria, NSW.



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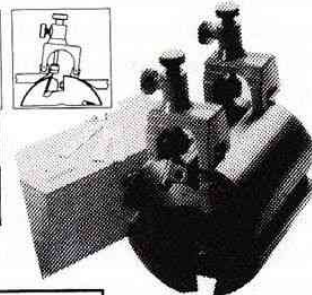
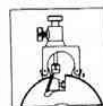
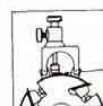
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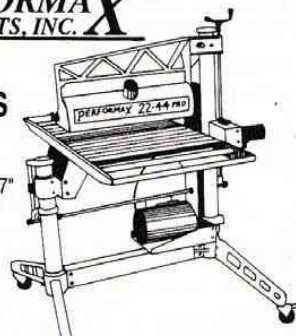
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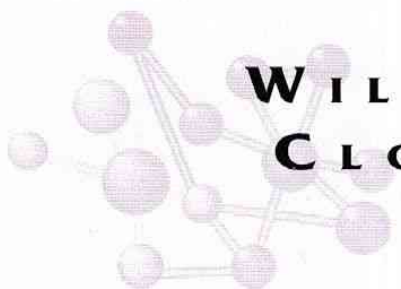
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WILL IT STICK? A CLOSER LOOK AT ADHESIVES

The advent of the new polymer glues in the 1930s and 40s came to largely free designers and makers from the practical constraints of traditional animal glues. As hide glue, these adhesives still have a role today due to time proven performance, strength, resilience and complete reversibility. But for most people, formulations of synthetic polymers are now accepted as the standard. Wood surfaces, a dab and wipe of some favourite brand-name adhesive followed by a squeeze and it is largely done. The tractability of both wood and now adhesives, seemingly removes the woodworker from the confrontation with physics and chemistry faced by a worker of hot iron or glass. But, are adhesives and wood really that simple at the glue-line?

Adhesives and Energy Accountancy

A surface whether solid or liquid, is not only a physical boundary, but is also an energy interface. From watching, for example, raindrops, dripping taps, bubbles, and insects walking and whirling upon the surfaces of ponds, the attraction between the water molecules of the surfaces is seen to be a perfectly real and conservative entity. When left to their own devices, all liquids are driven to adopt a minimalist approach to the energetics in their existence—the characteristic spherical droplet minimises both surface area and surface energy.

When a surface becomes involved with a liquid, whether the liquid beads up like water on a waxed finish or spreads, is due wholly to the outcome of molecular interactions and energy accountancy. For, say, water spreading and 'wetting' clean glass, the energy

needed for this material rearrangement comes from the interactions between the polar water molecules and the polar glass surface.

If after it has wet the solid, the water or other liquid is hardened by perhaps freezing, the energetics are not greatly changed. Thus, in principle, there is little difference between the stick of a glue (adhesion) and the inherent togetherness of the polymerised solid (cohesion). If it 'wets and sets', it's likely to be worth considering as an adhesive. In modern gluing theory, practices such as

toothing or roughing the surfaces in the hope of creating some mechanical-type linkage are largely without a general role.

Joint Design and Design Criteria

The design of a joint and the adhesive used is an intimate arrangement of engineering rationality and anticipation. The point in gluing-up a joint is to have a continuous film of adhesive between pristine, fresh surfaces. The integrity of the joint under work is determined by such things as the mechanical properties of the substrate and adhesive, internal stresses, degree of true interfacial contact and joint geometry. When working wood at the bench this checklist should be read off for even the simplest joint. For example, the harder the stock, the more clamp pressure required to snug everything up into molecular intima-

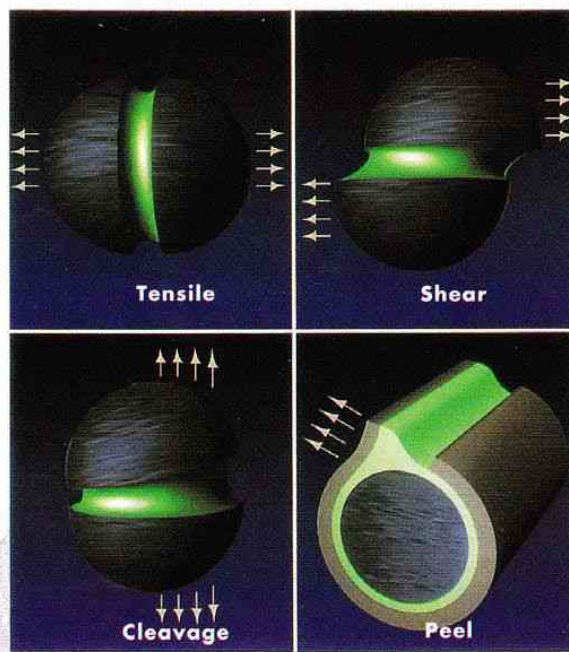


Figure 1: Types of stresses in adhesive joints. As shown, the stressing force is singular and unique. In the real world, some combination of two or more of these situations would be more typical.

cy. However, this means there is the danger of squeezing the joint dry and/or leaving internal stresses in the joint.

Stress Distribution in Joints

Since the function of a joint is to transmit load through a structure, stress always has to get itself out of one element into the adjoining one. This transfer is not always ideally uniform and stress concentrations can occur. If high enough, rupture of the joint or structure can then occur. Beside the perhaps trivial case of compression, adhesive joints can be subject to any one of the following four stress situations, either singly or in combination: tension, shear, cleavage and peel (see fig.1).

In pure tension, a uniform stress is imposed across the entire bonded area and is likewise found, for example, in

a glued scarf joint. However, if the load is offset to any degree, stress components like shear, cleavage and peel will occur. Shear loading is carried virtually only through the edges of the joint (fig.2).

An important design consequence of this is that if the overlap length is doubled, the load carrying ability of the joint increases by a markedly lesser margin. The maximal gain in strength comes about when its width is increased (fig.3).

In peel and cleavage situations, the stress is concentrated on one side of the joint and may be high at the boundary. Hard, even brittle, highly cross-linked adhesives such as unmodified epoxy and phenolic resins (the **thermosetting** adhesives) have high tensile and shear strength. When stressed at the ends or edges of the joint to the cohesive strength of the polymer, they crack. These cracks, each with their own private local concentrations of stress, run through the joint much as in glass. The utility of these sorts of resins is structurally limited and they are usually modified by incorporating some stretchy polymer within the resin matrix to improve fracture resistance. Thus, the design of a joint must include the choice of adhesive and adhesive family.

The adhesives derived from **thermoplastic** polymers yield to some extent under stress—they stretch a little with heat, load, or with wood movement: they don't crack, they creep. However, in yielding to stress concentrations at the edge of the joint, some of the load comes to be shared by the glue-line away from the edge of the joint. Such polymers, the very stretchy elastomers, and maybe stress resilient resins (**composite polymers**) would be the adhesives to choose for cleavage or peel stressed joinery.

In the design of furniture, structure is influenced more by a prerequisite for stiffness than strength; bendiness and general wobbliness are unacceptable. A table, for example, if made stiff enough to be considered a good and functional piece of furniture, would be strong enough under everyday loads. We overbuild and it is only in 'efficient' structures like a modern yacht hull or perhaps a chair, that each component and each joint is matched to the load it has to bear, so that, for a given strength, the weight is minimised.

Molecular Design and Wood Adhesives

The synthetic polymers of 20th century invention are usually sub-divided into the four groups alluded to above, based on the physical behaviour of the final polymer mass—**thermosetting**, **thermoplastic**, **elastomer** and **composite**.

The phenol-formaldehyde **thermosetting** resin adhesives were the first synthetics on the scene and derived from the plastic 'Bakelite' popular in the 1930s. It and all adhesives of the thermoset family give a rigid glue-line that just goes right on staying that way with heat and/or long

term loading. They are rigid because the molecular me-
lange has little option to do otherwise: the polymer chains are linked into a 3-dimensional covalent matrix by poly-functionality and formaldehyde. In contrast to this covalently laced state, the polymer chains of the **thermoplastics** are able to stiffly creep past each other under load.

Poly(vinylacetate) is the most familiar example of these adhesives. The presence of the polar acetate groups on the polymer chain provide strong non-covalent interactions between the molecules. This results in stiffness and rigidity of a film greater than that provided by something as wholly non-polar as poly(ethylene). Putting covalent cross-links between the polymer chains, not surprisingly locks the whole into a more cohesive mass which increases durability and makes the glue-line less creep prone. This is the thrust of the cross-linked PVA's.

Elastomers carry the dynamics of creep to the point of being actually stretchy. The first elastomeric solvent-based adhesive was introduced in 1791 and was a solution of rubber in naphtha. Today, the most widely employed elastomer is polychloroprene ('Neoprene') which, with the appropriate tackifying* resins, is especially popular for contact bond adhesives and the laying of laminates. Addition of elastomers to highly cross-linked resin systems, phenolic or epoxy, gives a **composite** adhesive with the qualities of both: a stiff structure, but one which has

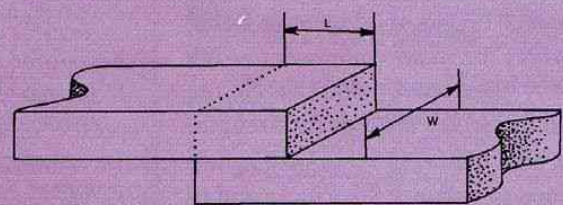


Fig. 2: Distribution of stress in the glue-line of a lap joint under tension. Such a profile is characteristic of this joint and is independent of whether it is glued, screwed or rivetted.

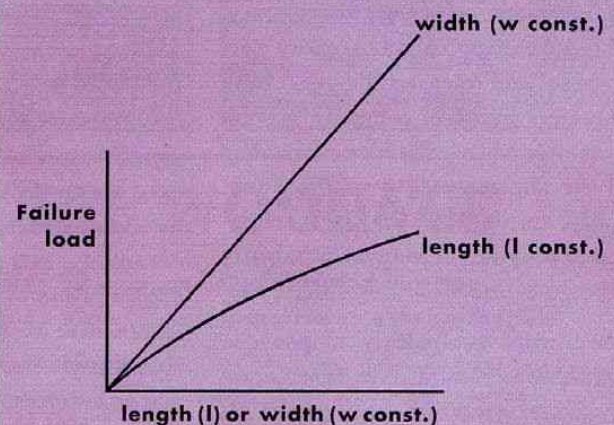


Fig.3 The relationship of the overlap and width of a lap joint to its effective load-bearing capacity. Increasing the width (w) results in a proportionate increase in strength, whilst increasing the overlap length (l) beyond a limit has little effect.

increased fracture resistance. The elastomer here may simply be chosen to dissolve in the resin, or be soluble within the uncured mass, but then to phase separate during the cure to form a two-component system. This leaves the inherent properties of the matrix largely retained, but with fracture resistance substantially improved.

The Fine Art of Formulation

Given that the adhesives industry is fragmented with many, often small companies whose market base often spans the entire range of available adhesive types, the design and synthesis of a wholly new polymer is a major undertaking.

To meet a challenge, it is more likely that changes in the presentation of an existent polymer would be used.

To predict from the essential behaviour of the listed polymer, an adhesive formulation's character, or what makes brand 'A', 'B' or 'C' different, will probably fall well short. A simple 'stick-anything-type' glue can, in fact, be a very complex mixture of ingredients: obviously if it is an elastomer-based adhesive, the main component is the stretchy elastomer from which the adhesive derives most of its strength. However tackifying resins are usually added to enhance stickiness and to increase the autohesion characteristics of the polymer; plasticizers might be added to make the adhesive more permanently soft; pigments and fillers to change the colour, control viscosity, and reduce cost. Solvents, a key portion of solvent release adhesives. With elastomers as here, a curing system may be added to build heat resistance and the shear strength of the bond. Finally, antioxidants may be incorporated to provide for long term stability of the glue-line.

In the even more complexly compounded formulations of adhesives based upon poly (vinyl acetate)—poly (vinyl alcohol) systems, the final product, the ready to use dispersion, is apparently a very simple system: it is water based and binds physically, not chemically. Yet, plasticizers, tackifiers, viscosity

and rheology modifiers, pH buffers, solvents, fillers, humectants, and so on, might be added as part of a formulation strategy. These diverse additives all stay in the glue line.

And What Of The Glue Line: Does It Last?

A time span of some 60 years would cover the commercial history of even the oldest of today's synthetic adhesive technology, a fraction of the time line of hide glue. From what little is known about the long term performance of modern adhesives, under furniture-type conditions, but there has been reported a fall-off in bond strength with time.

For Douglas fir and yellow birch plywood panels stored for four years at 27°C and 30% RH (relative humidity), those bonded with non-acidic resins, including phenol, resorcinol, and melamine-urea, lost little if any strength over this period. However, accompanying panels bonded with acidic types of resins (eg, a catalysed PVA and a phenol resin), lost from 20 to 30% of their original strength.

When stored under interior conditions for 24 years, losses in strength are reported in both plywood shear and solid wood lap joint tests with either urea-formaldehyde (UF) or phenol-formaldehyde (PF) resins. The percentage retention of initial strengths varied widely and especially among brands of any one adhesive type. The range of values were given as 60-75% retention for the UF and 75% retention for PF resin. In the lap tests, the corresponding values were 35-100% and 60-90% retention. The timber species used are 'mild' and not characterised by high extractives content or inherent acidity. In the interests of the future conservation of furniture, it would be informative to examine long-term glue-line behaviour with a number of timber and adhesive species.

In woodworking, the choice of an appropriate adhesive is driven by the requirements of the construction, the materials and the intended use of the piece. The interest for the long term

life of a piece as a part of design, seems to get overlooked in all this focused and immediate practicality. The needs of a maker of bespoke furniture and those of industry are not the same, for instance, the time reference is very different. Industry does not look to a polymeric material to maintain its stability and properties for a century or so and then be wholly reversible.

Yet, within the lifetime of a carefully crafted piece of furniture, this is sooner or later going to be important. Conservative repair of fine furniture put together with today's polymeric adhesives, whether they are formaldehyde-linked resins, isocyanate and epoxy types, or the ubiquitous PVA's, portend that this is not going to be a way to have a happy day.

Hide glue is still dominates in some cabinetmaking workshops. But if ambitious bent laminations are the way the shop is heading there are obvious problems. All our armoury of adhesives stick but seemingly an equally important problem lies at the other side of the equation: unsticking.

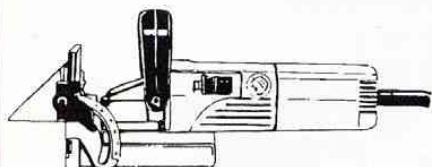
Thanks to Brian Lourey, A.C. Hatrick Chemicals Pty Ltd for arranging valuable technical guidance from Gus Liepens, Steve Browning and Fiona Byrne. Also thanks to 3M Australia

Issues #5 and #6 of Australian Wood Review featured a brief discussion, workshop evaluation and comparison of woodworking adhesives commonly available in Australia

Future articles will examine individual adhesive families such as PVA's, phenol-type resins, epoxies, etc.

**'Tack' is the term applied to quantify the sticky feel of a material and tackifying resins have found considerable use in modifying the characteristics of adhesives. They can be derived from such diverse sources as the rosin acids, the petroleum industry, or natural turpentine and citrus terpenes. The latter group give rise to the aliphatic tackifying resins listed in some PVA formulations.*

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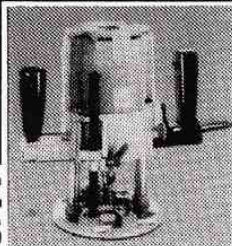
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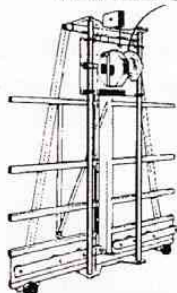
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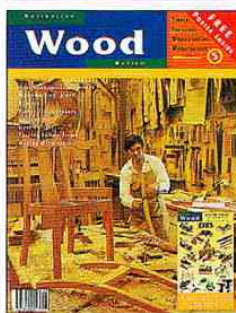
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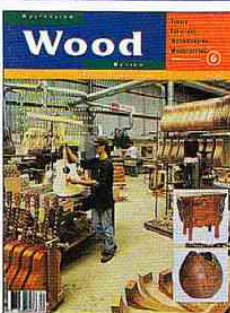
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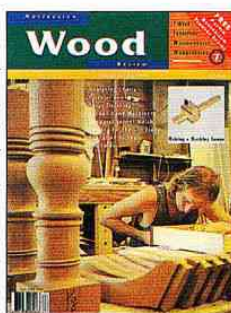
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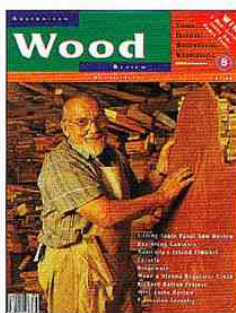
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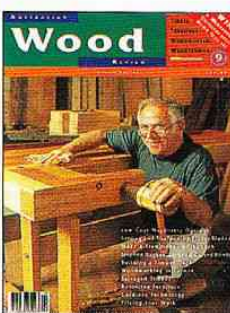
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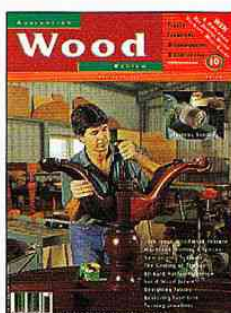
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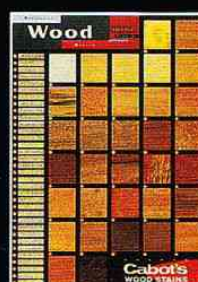
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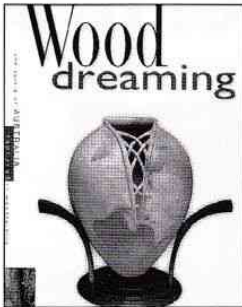


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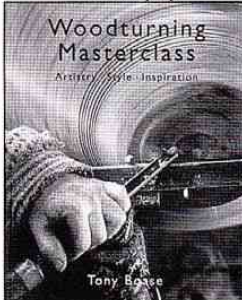


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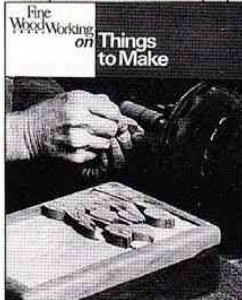
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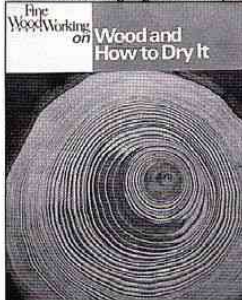
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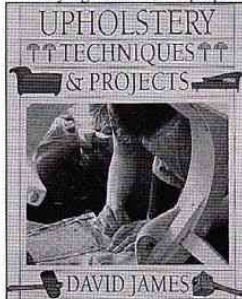
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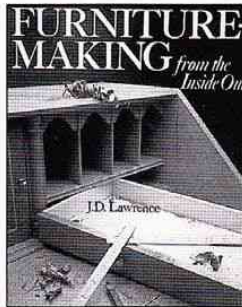
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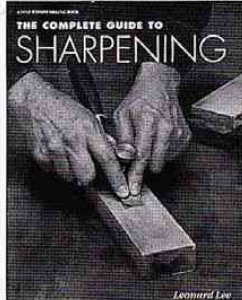
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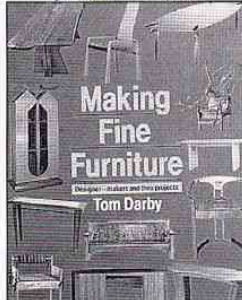
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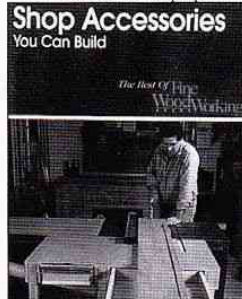
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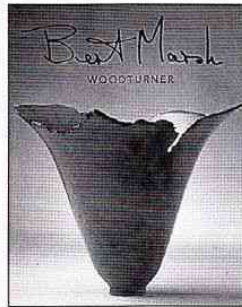
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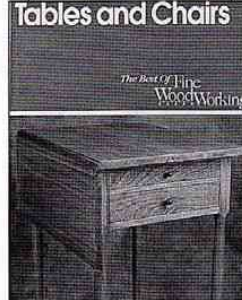
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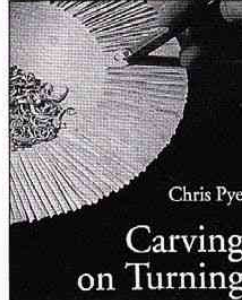
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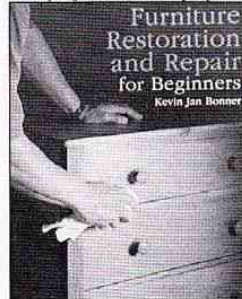
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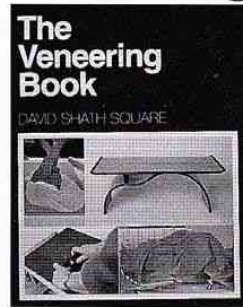
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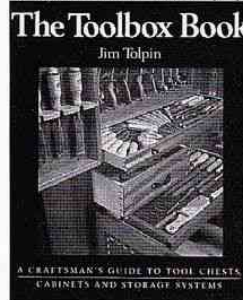
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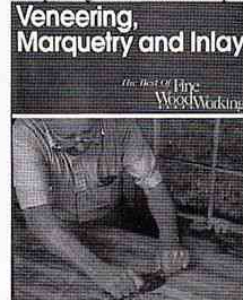
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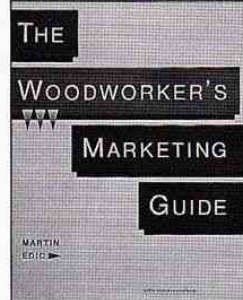
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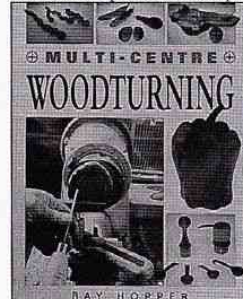
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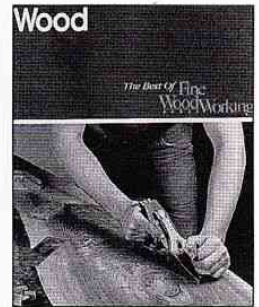
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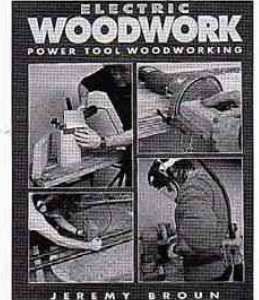
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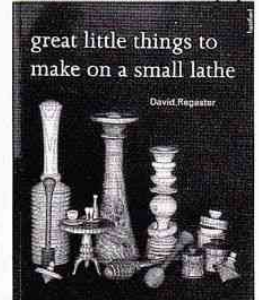
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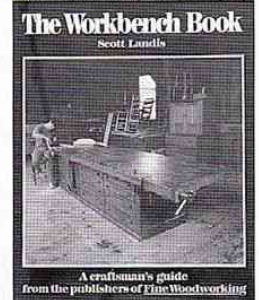
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Ted Anderson (03) 9874 7365

29 May-23 June

Living With Wood 96
Meat Market Craft Centre, Melbourne
Entry forms and information
Tel Vic Woodworkers Association:
(03) 9497 1916 Fax (03) 9387 7135

30 May-2 June

International Arts, Crafts & Hobbies Expo
Caulfield Racecourse, Melbourne
(03) 9751 1901

June 22-24

Turning Ten
10th American Assoc. Woodturners
Symposium, North Carolina
Tel: 612/484-9094 Fax: 612/484-1724

26-30 June

Woodtech 96, Malaysian Int. Wood-working, Timber Processing & Furniture Manufacturing Supplies
Kuala Lumpur
Tel: 60-03-735 6086
Fax: 60-03-735 6199

3-6 July

AWISA 96
Sydney Convention Centre,
Darling Harbour.
Info: Contact Exhibitions,
Tel: (02) 442 465
Fax: (02) 449 9332

6-21 July

Winterfest in Warburton (includes
Woodfest: workshops, demonstrations,
exhibition) Upper Yarra Arts&Ent.
Centre, Warburton
Entry forms and details
Tel: (059) 675207

12-14 July

Newcastle Woodworking & Craft Expo '96
Newcastle Showground
(049) 497474 or (049) 575 139

19-21 July

Sydney Timber & W.W. Wood Show
R.A.S. Showgrounds
Riddell (02) 712 5623, (03) 9429 6088

9-11 August

WA Wood Show
(includes 'Out of the Woods 96'
exhibition)
Claremont Showgrounds
(09) 307 7967 Fax (09) 334 8003

10-11 August

The Woodturners Society of Qld Inc Exhibition
Brisbane Botanic Gardens,
Mt Cootha, Qld
Tel (07) 3397 8156,
AH (07) 3821 2028

12-23 August

Out of the Woods 96
BankWest Foyer, Perth
Tel (09) 307 7967 Fax (09) 334 8003

22-25 August

Int. Woodworking Machinery & Furniture Supply Fair, Atlanta, Georgia, USA
Tel: 404-246-0608 Fax: 404 246-0620

3-7 September

Caloundra Art & Crafts Festival
Civic & Cultural Centre, Caloundra
(074) 925976

2-6 October

Taipei International Woodworking Machinery Show
TWTC: Tel 886 2 725 1111
Fax 886 2 725 1314

3-6 October

Furniture Woodtech '96, Bangkok
Reed Tradex Exhibitions
Tel 66 2 503 2199
Fax 66 2 503 4100 1

4-7 October

Treasures in Timber
Woodcraft Guild of the ACT
Canberra Inst. Technology,
Reid Campus
Tel: (06) 281 6548

18-20 October

Melbourne Timber & W.W. Show
Royal Exhibition Building
Riddell: (03) 9429 6088
or (02) 712 5623

24-27 October

Adelaide Timber & W.W. Wood
Wayville Showgrounds
Riddell (02) 712 5623

21-24 November

Int'l Arts, Crafts & Hobbies Expos
State Sports Centre
Homebush, Sydney
(03) 9751 1901

22 Nov-1 Dec

Wonderful Wood
13th Annual Woodwork Festival &
Exhibition, Victorian Woodworkers
Association, Doncaster, Victoria.
For details
Tel (03) 9497 1916
Fax (03) 9387 7135

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