

Wood is an organic material, and a great deal of its appeal comes from the endless variety shown in its colour, texture and patterning.

But because wood is composed of variously shaped and arranged cell structures, it can be a challenging material to work with.

This appendix will attempt to shed some light on the complexities of selecting and working with wood. It begins with a discussion on timber's characteristics, points out defects to avoid, explains how to allow for cross-grain timber movement, and concludes with some hints on how to buy timber.

SOFTWOODS AND HARDWOODS

The most basic distinction in wood is the difference between softwoods and hardwoods. These terms refer to the botanical origins of the wood.

Softwoods come from cone-bearing trees, often with evergreen needle-like leaves, and commercial timbers of this group are nearly all conifers. Timber species commonly available in Australia include Radiata Pine, Western Red Cedar, Douglas Fir (Oregon), Cypress, Spruce and Kauri (NZ).

Hardwoods come from broad-leaved trees, either evergreen or deciduous. The term does not denote the relative hardness of the wood, although hardwoods are generally denser than softwoods. Examples commonly available in Australia are: Mountain Ash, Alpine Ash, Messmate (these three species are usually sold under the trade name of Tasmanian Oak), Spotted Gum, Grey Gum, Karri, Jarrah, Blackwood, Queensland Maple, Brush Box, and the imported Merbau and Meranti.

TIMBER SELECTION

Which timber species is right for your project? A range of considerations may influence your selection. Cost may well be a primary criterion, and the fast growing *Pinus radiata* has become the most commonly used timber because of its relative cheapness. However, other factors should be relevant in your choice of wood.

These include:

DURABILITY ...a measure of a timber's resistance to attack from fungal decay and termites. All timbers exposed to moisture or outdoors are at risk. The danger zone especially for timbers in contact with the ground is 200 to 300mm above and below the ground line. If your project consists of fence or verandah posts, which are to be embedded into the ground, use either a very durable species such as River Red Gum, or a timber impregnated with a preservative ("Perma-pine" is *Pinus radiata* treated with copper - chrome - arsenic salts).

HARDNESS Is your project a kitchen bench top or a child's toy? Different uses require timbers which have varying degrees of impact or crushing resistance. Resistance to bending might be another concern (shelving, large construction etc.).

DENSITY Is the weight of your finished project important? An outdoor setting could be made from either Jarrah or Western Red Cedar, with equal durability, but greatly differing weight.

ODOUR Some timbers have a distinct "aroma". Examples are Camphorwood, Huon Pine, Cypress Pine, Cedar and Oregon. On the other hand, some timbers such as N.Z. or Queensland Kauri have no odour, and are particularly suitable for food utensils.

COSMETIC Will your finished project be prominently displayed? Cosmetic considerations include:

Colour: Examples of different species and their dominant colours are:-
Radiata Pine, Huon Pine — "straw"
Mountain Ash, Cypress Pine — yellow / brown
Myrtle Beech — pink
Karri, Jarrah — red, dark red
Spotted Gum — brown
Blackwood — chocolate brown

Texture: Refers to the distribution and size of the wood elements, and ranges from fine to coarse. It will influence how the timber takes a finish. Coarse textured timbers may need grain fillers prior to application of gloss finishes.

Grain and Figure: These characteristics will influence the final appearance of your project. There is often a "best" way to line up timber grain for visual appeal in your construction, and some time taken here prior to cutting will bear rewards in the look of your completed work. Wavy figure or "fiddleback" is often a prized feature in the better cabinet timbers.

The Nature of Wood

AVOIDING DEFECTS

Choice of timber species is the first step; avoiding defects in the timber you purchase is the next. Problems can be grouped into natural defects and drying defects.

The main natural defects in Australian timbers are **knots** and **gum veins**.

A **knot** makes no contribution to the overall strength of the wood — in fact a knot acts as if it were a hole. Furthermore, a knot causes a deviation of the grain (a cross grain effect) which often further reduces strength.

Gum veins are deposited by the tree like a shield to cover injuries caused by fire, insects or other causes. Veins, like knots, can be "tight" or "loose" and decrease the strength of your timber. Unfortunately, they are common in Australian hardwoods, and are often considered to be unsightly.

Drying defects result either from green timber being seasoned poorly, or from latent stresses present in the green log. Common problems include **cupping**, **bowing** and **twist**. (Figure 1)

Timber merchants usually grade their material into two types — SELECT and STANDARD. As their names imply, select timber is chosen for its appearance, and is destined to be used for furniture or cabinetry. Standard grade is structural timber, and is not meant to be seen. There is usually a significant price difference between the two categories.

It is also necessary to have an understanding of the difference between back-sawn and quarter-sawn timber, and this leads us onto the next topic — allowing for timber movement.

THE PROBLEM OF TIMBER MOVEMENT

Timber is hygroscopic, that is it takes up and releases moisture depending on the humidity of the surrounding air. So even if your timber has been seasoned correctly, it will continue to "work". Timber movement is complicated by the fact that it doesn't move equally in all directions. Changes in humidity hardly affect length at all. But shrinkage in width and thickness is appreciable, and varies according to the direction of the growth rings.

In most timbers, the shrinkage parallel to the growth rings (tangential shrinkage) is usually about double that at right angles to them (radial shrinkage). Radial shrinkage, in turn, is approximately fifty times greater than shrinkage along the length. (Figure 2).

This is why quarter-sawn timber is preferable in a number of contexts. Note from the illustration how most of the movement in a quarter-sawn board is in its thickness. Obviously quarter-sawn planks which are edge joined (say for a table top) will move less in total width than back-sawn boards.

Back-sawn material also has more of a tendency to cup, which is a result of the timber's annual rings trying to "straighten out".

Here are some other ways of limiting the potential problems that timber movement can cause:

CONDITIONING: If possible, try to condition your material before building your project by storing it for a few days in the same environment where the finished article will be. This helps the moisture content of the timber to match as closely as possible that of the surrounding air. This is particularly relevant if your project is to reside in a heated or air-conditioned room.

FIGURE 1: DRYING EFFECTS

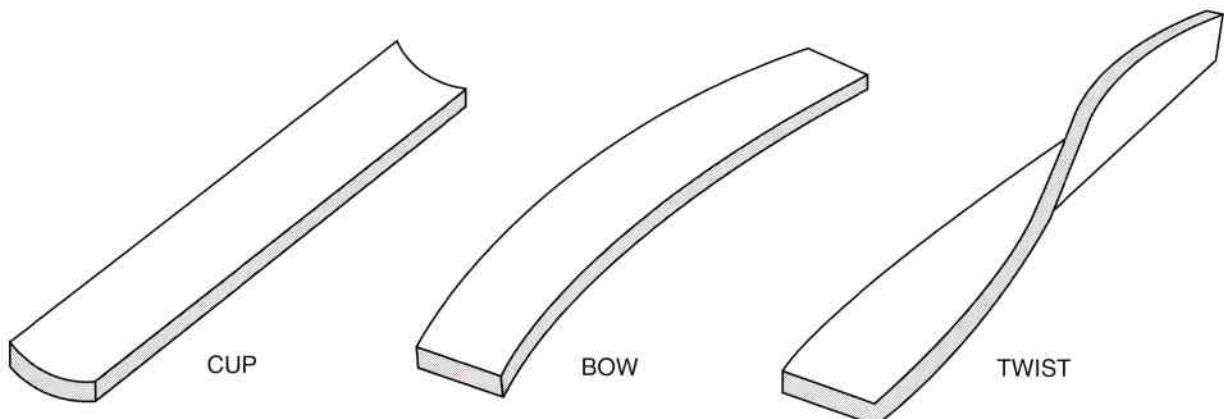
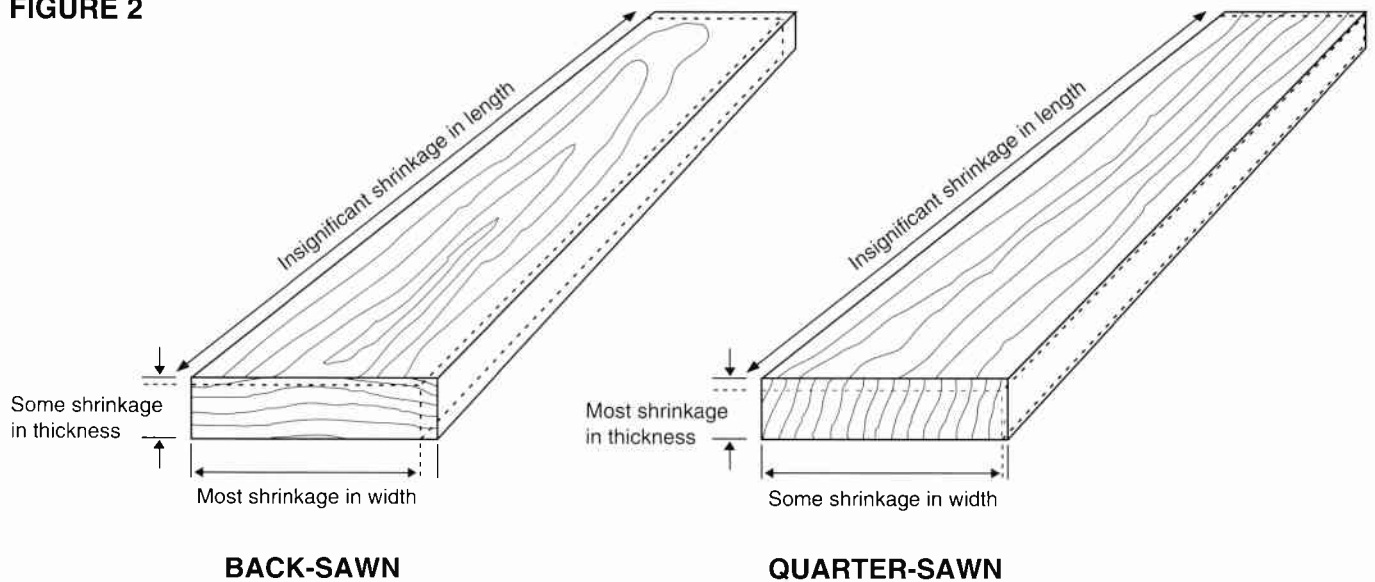


FIGURE 2



COATING: It is advisable to coat BOTH sides of your material with a moisture retardant finish such as poly-urethane. Not only will this slow the transfer of moisture from the timber to the air, and vice-versa, but it will prevent the warping that occurs when finish is applied to one face only.

DESIGN: When designing your own piece of furniture, be conscious of fastening one piece of wood cross-grain to another. There are correct ways of doing this, most commonly the technique of "slot-screwing" (fixing one component to another by using round-head screws, with washers, in elongated holes — don't glue! **Figure 3**) Wooden buttons sliding in grooves are an acceptable alternative. (**Figure 4**)

MAN-MADE MATERIALS: You can always avoid problems with humidity changes by using manufactured boards, such as plywood, particle board, or medium-density fibreboard (MDF). These man-made sheet materials have a balanced internal structure, and can be fixed without any concern for grain direction.

However, there are some constraints. Particle board does not have great bending strength, so if you plan to use this material for shelves or similar, it will need to be supported at regular intervals, or it will bow severely. Keep these materials out of direct contact with water too. Unless you are using an exterior or marine grade plywood, or a "wet-area" particle board, they will deteriorate rapidly in high moisture areas.

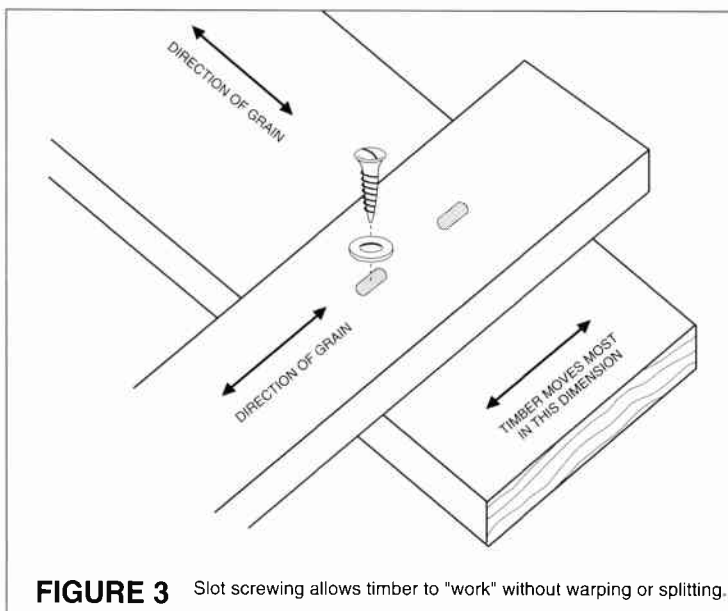


FIGURE 3 Slot screwing allows timber to "work" without warping or splitting.

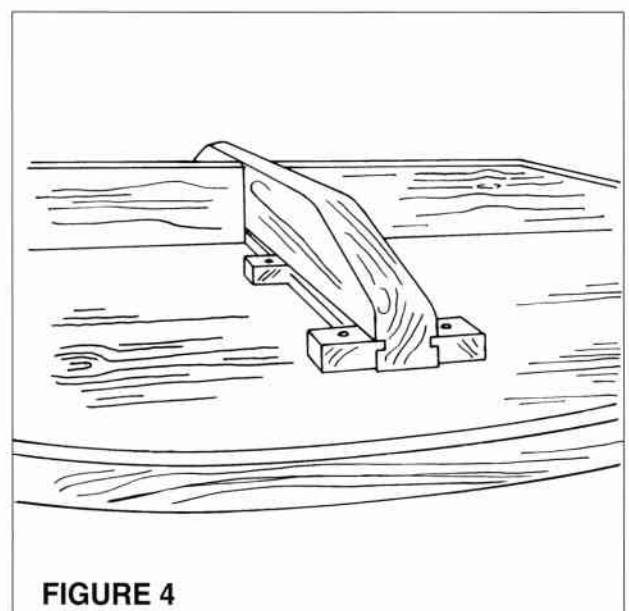


FIGURE 4

The Nature of Wood

BUYING YOUR TIMBER

Having made your decision about the type of timber you want for your next project, you now need to organize its purchase. The most obvious source is your local hardware store or timber yard, but it is wise to shop around. Different timber yards make a point of specializing in different species, and the price of timber varies from yard to yard. Don't be afraid to reject unsatisfactory material, especially if you are buying "select grade" for a special furniture project.

It is often worthwhile too, to check for bargains in the "Building materials" advertising section of the larger newspapers.

As you shop, you will need to know the difference between **nominal size** and **finished or actual size**. The nominal size is the rough-sawn size of the timber, while the actual size is the planed or dressed size. Quite often the nominal size is quoted and the finished size is substantially smaller. Your supplier should tell you what size he finishes to; this area is complicated by the fact that different suppliers dress to slightly different sizes. It is wise to check-measure the exact dimensions of your finished material. Often the machining of the timber varies slightly from batch to batch.

Timber which has been planed on all faces and edges is commonly specified as ***dressed-all-round (DAR)***. Note that the ends of all timber, DAR or otherwise, is usually rough cut, and will need to be trimmed prior to being used in your construction.

Cross-section dimensions in Australia are normally specified as width by thickness, i.e. 90 x 45 rather than 45 x 90. It is usually sold in standard lengths, starting at 0.9m, and increasing in 300mm increments up to 4.8m.

Finally, Timber Promotional Organisations exist in each state and can be a most useful source of information. They can help with specific product information or direct you to appropriate suppliers.

TIMBER PROMOTIONAL ORGANISATIONS

VICTORIA

- Timber Promotional Council
932 Swanston Street, Carlton 3053
(P O Box 386, South Carlton 3053)
Telephone (03) 347 6322
Fax (03) 347 1226
- Timber Merchants Association
180 Whitehorse Road, Blackburn 3130
Telephone (03) 877 2000

NEW SOUTH WALES

- Timber Advisory Council
Oratava Avenue, West Pennant Hills 2120
(P O Box 100, Beecroft 2119)
Telephone (02) 871 1458
Fax (02) 872 5565
- Timber Development Association of NSW
525 Elizabeth Street South, Strawberry Hills 2012
(P O Box 34, Strawberry Hills 2012)
Telephone (02) 699 1388
Fax (02) 699 8068

QUEENSLAND

- Timber Research & Development Advisory Council
5 Dunlop Street, Newstead 4006
Telephone (07) 852 1344
Fax (07) 52 2607

SOUTH AUSTRALIA

- Timber Development Association of S. A.
113 Anzac Highway, Ashford 5035
Telephone (08) 297 0044
(No facsimile)

TASMANIA

- Tasmanian Timber Promotion Board
68 York Street, Launceston 7250
(P O Box 440, Launceston 7250)
Telephone (003) 31 6077
Fax (003) 31 1679

WESTERN AUSTRALIA

Forest Products Association
103 Colin Street, West Perth 6005
(P O Box 254, West Perth 6005)
Telephone (09) 322 2088
Fax (09) 481 1019
