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FLOORING TIMBERS OF NEW SOUTH WALES

For more than two hundred years, timber from New South Wales forests have provided an efficient, economical and aesthetically pleasing flooring solution in all manner of private, commercial and public buildings throughout Australia. From the most basic of early bush huts, to tens of thousands of homes and, more recently, as a major feature of Australia's Parliament House and other important monumental projects, New South Wales timbers with their huge range of colours, unique properties and unequalled natural beauty, have been re-discovered as a valuable and desirable feature in many homes and commercial premises.

In new or renovated buildings, just a few of the benefits of timber flooring are:

- Appearance: an infinite variety of colours and patterns
- Comfort: a long term natural resilience only possible with timber
- Ease of maintenance: regular and long term maintenance is considerably less than with many alternatives
- Health: does not harbour potentially harmful dust and is easily cleaned
- High strength to weight ratio: compared with many alternatives
- Lower costs: no need for the regular expensive cleaning and replacement costs associated with some floor coverings.

SPECIES AVAILABLE

The Table on page 2 identifies the species most suitable for flooring. However, it is unlikely that a complete range would be stocked by more than a very few suppliers. Buyers, therefore, are advised that before specifying and if they require anything out of the ordinary, they should contact their supplier and ensure their orders are placed well in advance.

The names given to these timbers are the Standard Trade/Common Names listed in Australian Standard AS 2543 "Nomenclature of Australian Timbers".

While there may, from time to time, be other New South Wales hardwoods available, their occurrence is so limited as to be inconsequential.

The timber species in the Table are intended to refer principally to tongue and grooved strip flooring, however, a number of them are also commonly used species for mosaic and block parquetry flooring.

In addition, tongue and grooved particleboard and plywood sheet flooring are available from most timber suppliers and are utilised extensively throughout Australia in all manner of construction, from domestic, commercial and industrial substrates for other overlays, to floor coverings in their own right. In the main, these product groups are manufactured from plantation grown softwood species although for special purposes, such as when particularly high strength or impact resistance is required, native hardwood veneers may be used as core or face material for the construction of plywoods.

GUIDE TO SELECTION

Factors worth considering when deciding on the right species for your requirements include colour, resistance to wear, ease of maintenance and of course, availability.

Species or species group	Strength group Seasoned	Density 12% mc (kg/m³)	Colour	Availability: ■ readily ▲ limited X not normally
Mixed open forest hardwood (excluding ash types)	SD3	770-1170	Pale straw to dark brown	■
Ash, alpine (1)	SD4	663	White to light brown	■
Ash, silvertop	SD3	862	White to pale straw	X
Blackbutt	SD2	884-930	Pale to light brown	■
Blackbutt, New England	SD3	880	Pale to light brown	▲
Box, brush	SD3	880	Pink to red brown	■
Gum, blue, Sydney	SD3	843	Light red to red brown	■
Gum, red, river	SD5	900	Light red to red brown	▲
Gum, rose (flooded gum)	SD4	750	Light to red brown	▲
Gum, spotted	SD2	1010	Brown to dark brown	■
Ironbark, grey	SD1	1100	Light brown to dark brown	X
Ironbark, red	SD3	1090	Light red to red brown	X
Messmate (1)	SD3	770	Pale straw to light brown	X
Pine, cypress, white	SD6	675	Pale straw to dark brown (knotty)	■
Pine, radiata	SD6	545	Pale straw to yellow (knotty)	■
Stringybark, yellow	SD3	884	Yellow brown	X
Tallowwood	SD2	1010	Pale straw to dark brown (greenish tinge)	▲
Turpentine	SD3	945	Pink to red brown	▲

Note: Species marked (1) are usually available only in mixed parcels as Victorian ash or Tasmanian oak.

Colour

Part of the appeal of wood is its infinite variety of grain, appearance and colour, not only between species but also within the species and within individual boards. It is advisable before purchasing that buyers examine actual samples of the species required. However, it must be appreciated that as timber is a natural material, considerable variation can, and probably will, occur between any samples and the material finally delivered. It must also be understood that the appearance of a raw or uncoated board will vary considerably in appearance from one with a coat of finish. To get some idea of what the dressed surface will look like when coated with a clear finish, wet a small portion of it with water.

Ease of maintenance

Pale colours will highlight bruises and ingrained dirt far more readily than dark ones which will reveal lint, fine household dust, and will soon show foot marks; so if maintenance is an important consideration, as in commercial premises, it would be advisable to choose a mid range colour such as one of the pink species.

Softer timbers, naturally, will be more difficult to maintain than the hard, virtually impervious species.

Resistance to wear

If it is intended to protect the floor from wear in high traffic areas with carpets or some other material, soft timbers may be suitable and can look magnificent when polished. However, if a feature floor is to be laid in a building where the foot traffic is heavy, the hardness of the timber must be a prime consideration.

Of the timbers listed earlier, an approximate order of hardness is as follows, the hardest being listed first:

ironbark, turpentine, spotted gum, brushbox, tallowwood, blackbutt, Sydney blue gum, messmate, rose gum, cypress pine, radiata pine.

Because of the infinite variability within species, and because the hardness values for many hardwood species are very similar, the above list is intended only as a guide and purchasers should not be overly swayed by hardness values. Just as important is the timber's resistance to edge splintering and it is in this respect that close-grained species, like brushbox and turpentine, are outstanding.

General recommendations

If a floor is to be covered, there is obviously no need to specify a select grade timber, nor is the hardness of the species likely to be of major importance. In these cases it is quite acceptable to use a 'standard' or lower grade (common, carpet grade) of undefined hardwood species. Where a floor has to withstand exceptionally heavy wear or point loads such as in factories, warehouses and sporting complexes, the close textured timbers such as brushbox and turpentine are considered to be outstanding because of their general resistance to this type of abuse.

The conditions experienced by a floor completely exposed to the weather (a sun deck, for example) are particularly severe. It has not yet been possible to develop a clear finish that will guarantee long-term protection under these circumstances, so it is important to use a timber with a high natural durability that also has good wearing qualities, or a preservative treated softwood species. Tallowwood and blackbutt are two timbers favoured for external use but the use of tongue and grooved flooring is not recommended. Rather, a specially milled decking profile should be specified. However, where tongue and grooved (T&G) flooring is to be used, for instance on a covered verandah that may still be subject to weathering, care should be taken to provide sufficient 'fall' to ensure water run off away from the building.

QUALITY STANDARDS

As described earlier, timber is a natural material and cannot be expected to be uniform in appearance and free of all blemish. If it were it would probably loose much of its appeal. Each species has certain features that are characteristic of it; to make it clear to both buyer and seller what is or is not permissible in a particular grade of timber, Standards Australia publishes grading rules for the various groups of timbers used in flooring.

The Australian Standards applicable to flooring from New South Wales species are:

AS 1261-1972	Wood mosaic parquetry (bound with AS 1262).
AS 1262-1972	Code of practice for the installation of wood mosaic parquet flooring.
AS 1492-1973	Flooring milled from radiata pine (bound together with AS 1783 to 1498).
AS 1810-1975	Flooring milled from cypress pine.
AS 1860-1991	Installation of particleboard flooring.
AS 2796-1985	Timber-seasoned hardwood-milled products.
AS 2796 Pt 1-1986	Wall chart-summary of surface finishes for all seasoned hardwood milled products (in accordance with AS 2796, complete set).
AS 2796 Pt 2-1986	Wall chart-summary of permissible machining imperfections for seasoned hardwood milled products (in accordance with AS 2796, complete set).
AS 2796 Pt 3-1986	Wall chart-summary of permissible natural imperfections for seasoned hardwood milled products (in accordance with AS 2796, complete set).
AS 071-1960	Wood blocks for parquetry flooring (bound with CA31).
CA39-1963	Code of practice for the sanding of interior wooden floors.

In the Australian Standards, where both a select and a standard grade are given, the standard grade material is normally intended for covered floors and the select grade for clear-finished decorative use. However, in recent years, because of the added character in the boards, standard grades are finding considerable favour among designers and decorators looking for something different or unusual.

When ordering flooring, or indeed any timber building products, it is advisable to specify in writing any applicable standards that may apply. This has the dual effect of clearly defining the exact requirements to the supplier and provides a clear and concise record in case of any dispute.

Inspection service

As an aid to both suppliers and consumers, State Forests of New South Wales operate a Timber Services Branch. The Branch provides, on a fee for service basis, a timber inspection service staffed by expert personnel who will, in the case of flooring and before it is laid, inspect timber on a piece by piece basis to ensure that it complies with either the relevant Australian Standards or any other special requirements set out in the client's order.

Identification service

The Research Division of State Forests of New South Wales provides a species identification service on a fee for service basis.

SEASONING

Freshly sawn timber contains a considerable amount of water. In the case of flooring, most of this water must be extracted from the timber before it can be used since the loss of moisture will cause uneven dimensional changes during the drying process and shrinkage when the floor is fixed in position. Under normal conditions the atmosphere will absorb moisture from timber quite rapidly if relative humidity is low, or slowly if it is high. In any case, once timber is cut it will invariably lose moisture in varying degrees and rates unless totally submerged.

The actual wood substance will not begin to shrink appreciably until its moisture content reaches what is called 'fibre saturation point', or approximately 25-30% moisture content. At this point, while all the free water contained within the individual wood cells is considered to have dried out, there is still water bound up in the cell walls. From there on, the amount of shrinkage increases at a steady rate as the cell walls loose their water until a stage of equilibrium, or balance, is reached with the amount of moisture present in the surrounding atmosphere. This moisture level will of course vary with climate, season and location, but for coastal New South Wales it is generally within the range of 10% to 15%. In most Australian Standards for flooring, timber must be within this range to be termed 'seasoned'. Where an Australian Standard does not apply and where there has been no formal agreement between buyer and seller to the contrary, the New South Wales' Timber Marketing Act requires that milled timber, or timber described, or giving the impression of being seasoned or dry, must be within the range of 10% -15% moisture content.

The influence of relative humidity is far greater than that of air temperature in drying, and for each relative humidity there is a corresponding equilibrium moisture content which the timber will eventually reach if those conditions remain stable. The following Tables provide some interesting data:

Relative humidity	Value of equilibrium moisture content (%)					
	16°C	21°C	27°C	32°C	38°C	43°C
10%	3.5	3	below 3	below 3	below 3	below 3
20%	5	4.5	4.5	4	4	3.5
30%	6.5	6.5	6	5.5	5	5
40%	8.5	8	7.5	7	7	6.5
50%	10	9.5	9	9	9.5	8
60%	12	11.5	11	11	10.5	10
70%	14	13.5	13.5	13	12.5	12
80%	18	17	17	16.5	16	15.5
90%	23	23	23	22	21	20
100%	Wet	Wet	Wet	Wet	Wet	Wet

The effect of climate on the equilibrium moisture content in New South Wales is apparent in the following readings, taken indoors in the areas shown:

Location	Equilibrium moisture content (%)	
	Max	Min
Sydney	15	10
Bathurst	13	9
Broken Hill	12	7
Canberra	13	9
Coffs Harbour	15	13
Newcastle	14	11

Some fluctuations in the equilibrium moisture content of timber when in service are inevitable, except in cases where an artificial environment is created, as in a building with *carefully controlled* air conditioning. The resulting movement in the timber should not be a major problem providing the timber floor at the time of laying is seasoned to the average of the moisture content range expected in service.

If not taken into consideration in the planning stages, air conditioning can present problems because it usually results in a considerable reduction in relative humidity that can cause excessive shrinkage in timber seasoned within the 10% - 15 % range. Winter heating based on oil or gas burners etc. is not necessarily as severe, but any factor that could be expected to have an effect on humidity levels should be taken into consideration before timber is laid. In air conditioned buildings it is desirable for the system to be in operation before the timber is fixed into position. The ideal situation would be to have the seasoned timber distributed in its new environment to allow for the free passage of air around individual boards for several weeks to ensure they reach equilibrium with the atmosphere before being fixed in position. A fact of life is that while air conditioning might be expected to operate within a reasonably narrow temperature and humidity range, in practice it is extremely difficult to achieve uniformity throughout an air conditioned building. Ultimately, any number of factors will affect its operation; large windows and the normal practice of shutting off the equipment at night and weekends will all contribute to variations in the effect of relative humidity. As a general rule, timber to be used in air conditioned buildings should be dried to an average moisture content of approximately 8% or less. Technical advice should be sought on this matter because there are too many variables to make generalisations.

ORDERING FLOORING

It is common to refer to T&G strip flooring as say, 75 mm x 25 mm and 100 mm x 25 mm tongue and grooved flooring. However, this does not mean the individual boards when laid will cover 75 mm or 100 mm. These sizes refer to the sawn boards from which the seasoned and profiled boards were obtained. A typical 100 mm x 25 mm nominal size board generally has an effective cover (or finished size) of approximately 81 mm (depending on the manufacturer) and a finished thickness of 19 mm, 25 mm or 31 mm (depending on the intended use).

Additionally, boards may either be 'centre milled', that is the tongue and groove located centrally, or they can be specified as 'off centre milled', that is there will be more timber in the area above the tongue and groove than below it (Figure 1). This profile allows more scope for sanding and re-finishing over the years and is usually limited to *finished* board thicknesses of 25 mm or more. In most cases this would only be needed in commercial situations and would not be necessary for domestic use.

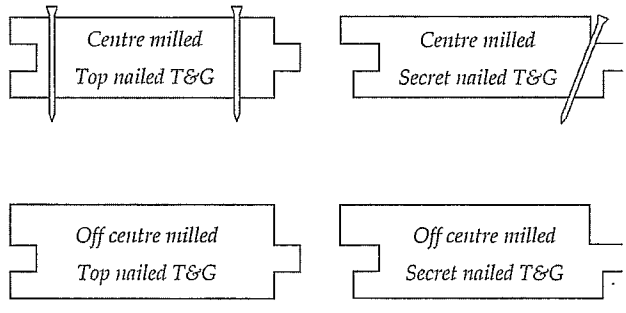

Figure 1. Typical flooring profiles.

The term 'finished size' is given to the actual covering capacity and final thickness of the board; it ignores the projection of the tongue. When ordering flooring, allowance has to be made for the smaller actual size that will be supplied.

An additional allowance must be made for the inevitable waste that will occur when flooring is cut to fit individual rooms and joist spacing. The usual allowance for this waste is 10% if random length flooring is used. The use of end-matched flooring, mentioned later, would reduce this figure to about 5% as the ends of the boards do not have to meet above supports. As an alternative, set length timbers could be ordered but these would normally attract a premium price that would probably outweigh any saving.

A simple formula to calculate the quantity of flooring for say a 3.6 m x 4.8 m room = 17.28 m^2 using the above example of 100 mm x 25 mm flooring with an effective cover of 81 mm is as follows:

$1000 \div 81 = 12.346$ lineal metres of flooring per m^2 x 17.28 m^2
= 213.34 lineal metres.

Add a further 10% for plain end random length flooring as a cutting allowance, or 5% if the flooring is 'end matched' (i.e. tongue and grooved at the ends of the board).

LAYING THE FLOOR

Subfloor

The bearers and joists must be of adequate size for the spans used (refer to the NSW Timber Framing Manual, or AS 1684 The National Timber Framing Code) and carefully laid so that they bear evenly on the supports. Ideally, subfloor timbers should be accurately sized to ensure a uniform level for the chosen flooring material. Dry, or 'seasoned' subfloor timbers, while costing more initially, will often result in considerable labour savings and, in the long term, a potentially far more stable and solid floor.

Ventilation

Adequate subfloor ventilation is a major consideration, not only to ensure that timbers remain stable, but for the health of the building occupants. It should be noted that the requirements for subfloor ventilation set out in various codes and standards are **minimum** requirements only. In general the more ventilation it is possible to provide, the better. Further details, see Technical Publication No. 11 "Ventilation under timber floors".

Handling

As mentioned previously, it is excellent practice to lay floorboards out in the area or atmosphere in which they will eventually be fixed. This will help ensure the timber reaches equilibrium with the surrounding atmosphere and will generally minimise any incidence of swelling or shrinkage when finally fixed in place.

To help ensure a top quality feature floor, timber should not be brought to the site until the building is weatherproof (i.e. windows in place and roof covering fully waterproof) and the brickwork, cement render etc., have dried out. When any wet work, such as the setting of wall board joints is carried out later, due care should be taken to minimise any wetting of the floor.

Nailing

In Australia, strip flooring is invariably fixed to timber joists by nails, and there are two methods of fixing:

1. **Face nailing:** For boards with a nominal width of 75 mm or less, two nails are used to fix the ends of the boards to the joists while a single nail is used at intermediate points. Where the boards are more than 75 mm in nominal width, two nails are driven through the face of each board at each bearing on the joist. It is generally recommended that if hand nailing near the ends or edges of most seasoned boards the nail holes should be pre-drilled at least part way through the piece. Special blunt (or shear point) nails are available for use with free-splitting timbers (e.g. cypress pine). In general most strip flooring is face-nailed and some may consider its appearance is blemished by nail holes that must be carefully punched and filled with tinted filler. However, where filling is skilfully done, the final appearance is usually more than satisfactory (refer Figure 1).

2. **Secret nailing:** When a perfectly clear face finish is required it is possible, by the use of specially profiled boards, to completely cover all nail heads - hence the term 'secret nailing'. The nails are driven at an angle through the base of the tongue; when the next board is fixed in position it covers the previously driven nail (Figure 2). This means that the board is, in effect, held by only one nail at each bearing, so secret nail flooring is not generally recommended for boards of a greater nominal width than 75 mm.

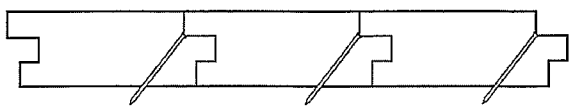

Figure 2. Secret nailed tongue and grooved flooring.

3. **Precautions:** Before nailing begins, the moisture content of the boards should be checked. If flooring is fixed when its moisture content is well below what will be expected in service, subsequent swelling could cause the floor to lift off its supports (Figure 3) and in extreme cases, where insufficient allowance for expansion has been provided, it has been known to push out walls running parallel to the direction of the floor. On the other hand, if boards are laid at too high a moisture content they will inevitably shrink and unsightly gaps will occur between them. To ensure good appearance the boards are cramped together before the nails are driven. Floor cramps, also called

'dogs', are used when installing face nail flooring. Tongue and grooved boards (T&G) should be cramped in sections not greater than 900 mm wide and if power nailing is used, nails should be hand punched to ensure the boards are firmly seated. Hand nailing at every sixth joist should be completed prior to power nailing. When secret nailed flooring is used, it is obviously impossible to cramp any more than one board at a time so the usual method, if hand nailing, is to lever each board into position with a chisel driven into the joist. Special nail guns are more commonly used and provide the same result.

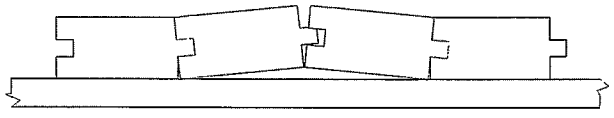

Figure 3. Peaking.

4. **End-matched flooring:** Regular plain end strip flooring must be joined over a support (usually a joist) which inevitably involves some cutting waste and, in the case of face-nailed flooring, a cluster of four nail holes which may detract from the finished appearance. To overcome this, some manufacturers put tongues and grooves in the ends of their flooring boards which enables them to be joined at any point, giving a better pattern of butt joins, a reduction in the number of nail holes and a considerable saving (up to 5%) of timber. End matched flooring should be limited to domestic or light commercial applications. Its use in areas of high point or impact loads should be avoided at all costs.

PARQUETRY

In addition to T&G strip flooring, parquetry is a popular alternative although it must be laid on a solid base of timber sheet flooring or concrete. There are two common types of parquetry available, mosaic and block.

Mosaic consists of small pieces ('fingers') of seasoned timber, typically 100 mm to 150 mm long, 19 mm to 22 mm wide and 6 mm to 10 mm thick. Many species, grades and mixtures of timber are available to create extremely interesting visual effects. Because of their small size, the individual pieces are held together on a mat of paper, mesh or aluminium foil, similar to that used for small ceramic tiles, to assist in handling and laying.

Block parquetry, on the other hand, consists of individual pieces of very accurately dimensioned timber, usually about 250 mm long, 60 mm wide and 19 mm thick. The laying of block parquetry is extremely labour intensive with each piece of timber being laid individually in a wide range of patterns, species, or mixes of species to form visually spectacular effects.

In recent years there has been a resurgence of interest in both types of parquetry, particularly in domestic and retail situations.

While the laying of mosaic parquetry sheets may be within the capabilities of some home handy persons, it is recommended that professional assistance be sought before contemplating the fixing of block parquetry.

As noted earlier, Australian Standards AS 1261 Wood mosaic parquetry flooring, AS 1262 Code of Practice for the installation of wood mosaic parquetry flooring and AS 071 and AS CA31, which relate to wood blocks for parquetry flooring and a Code of Practice for the laying of this material, provide information about grades and methods of installation.

SHEET FLOORING

Sheet flooring products are used extensively throughout Australia in situations from light domestic to heavy industrial. In typical domestic construction, both plywood and particleboard T&G flooring are usually employed in platform systems (Figure 4). In this method of construction, the sheets form a continuous membrane across the entire floor area and all subsequent construction is then able to proceed on top of the platform.

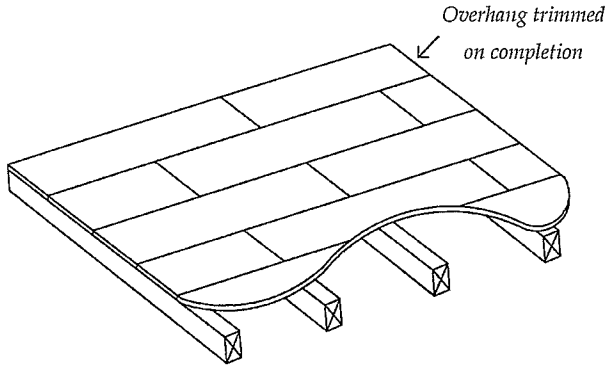

Figure 4. Sheet platform flooring.

As with other flooring systems, sheet flooring must be securely fixed over intermediate supports with the panels being staggered in a brick pattern in much the same way as strip flooring.

While usually expected to be covered with a decorative material before going into service, there is no reason why most sheet flooring cannot be left in a raw state or sealed with one of the available recognised floor finishes, providing it is protected from the weather and abnormal treatment.

A major benefit of sheet flooring, particularly plywood, is that when correctly installed in accordance with the manufacturer's or an engineer's instructions, considerable composite action with the timber floor frame is established ensuring a much wider distribution of dynamic loads, thus reducing the likelihood of springiness or squeaking, and in many cases providing considerable savings over alternative systems.

FINISHING THE FLOOR

Information relating to the sanding, finishing and maintenance of timber flooring is given in Technical Publication No. 12, "The Finishing and Maintenance of Timber Floors".

COMMON FAULTS AND THEIR CORRECTION

Large gaps between tongue and grooved boards

This may be due to:

1. The laying of unseasoned flooring, with consequent reduction in board width due to shrinkage.

2. The use of boards with excessive spring which was unable to be removed by cramping of the floor. The cutting of such boards into shorter lengths before use would probably have solved this problem.

3. The wetting of seasoned flooring after laying. Pressure exerted by the swelling of the wood may be great enough to crush the edges of the boards; when the flooring later dries the consequent shrinkage may result in a considerable gap between boards.

The filling of large gaps between boards in order to improve the appearance of a feature floor is rarely successful. Products such as plastic wood, wood filler, etc., are not suitable for this purpose because the inevitable movement between the boards due to seasonal changes in humidity will eventually fracture the filling. If the gap is not too unsightly, it is often better to accept it as it is. If it is too wide and it is not practicable to completely re-lay the floor, or if only a few boards are affected, the insertion of a thin piece of timber of the same species as the flooring may be an option. Alternatively, it is possible, in extreme instances, to totally remove and replace the affected boards.

'Blown' floors

The term 'blown' refers to a condition where the entire floor expands to such a degree that the boards either lift off the joists, lift the subfloor timbers off their supports or, in the case of parquetry, it loses adhesion and lifts off its base (Figure 5). In extreme cases of expansion of T&G strip flooring, the walls parallel to the direction in which the floor has been laid may be pushed out of alignment if sufficient provision for expansion between the wall and the flooring has not been made. The cause is usually one of the following:

1. Timber with too low an initial equilibrium moisture content.

2. Excessive under-floor moisture coupled with inadequate ventilation.

3. Inadequate provision for expansion joints in large areas.

4. Flooding or excessive wetting of the floor surface.

5. In the case of parquetry, flooding, or an inadequately cured concrete base is often the problem.

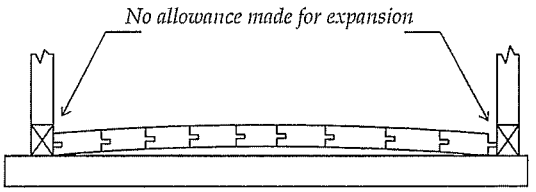

Figure 5.

The remedy will depend very much on the severity of the situation and could vary from taking out an edge board, to cutting an expansion joint or, in extreme cases, taking up and relaying the floor. In any case, the reason for the problem must be identified and corrected before re-fixing the floor.

Cupping

A regular pattern of undulation of the boards, in which the edges are raised to a higher level than the centre of the width of the board, is called cupping and is usually an indication of excessively damp under-floor conditions (Figure 6). The undersides of the boards increase in moisture content and swell, thus forcing the drier upper surface to become concave. Early correction of the damp conditions may cure the problem without permanent impairment of the appearance of the floor.

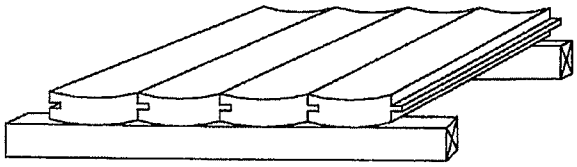

Figure 6. Cupping.

Squeaking floors

The irritation caused by a badly squeaking floor can only be appreciated by those living with one. The problem is normally caused by excessive deflection of the boards between supports and the consequent rubbing together of portions of adjacent boards. Sometimes it may be only a seasonal phenomenon that occurs when the boards have shrunk or swollen just sufficiently to provide the right pressure for squeaking, but it is essentially due to the excessive flexibility of some boards, arising from factors such as:

1. The weakness of a section of a board due to the presence of an exceptionally large knot or other defect.

2. Too great a span between joists or excessive deflection of bearers or joists due to a lack of packing or firm support, or some structural fault in these members.

3. Poor milling, resulting in loose-fitting tongues which give too little support to the board when under load.

4. The use of flooring milled before seasoning that subsequently shrinks or distorts.

5. The use of damaged boards with broken tongues or missing bottom edges.

There are many ways of reducing the noise of squeaking floors. As with most things, such a problem will affect people in different ways. While it is quite normal for timber floors to make occasional noises, even such a minor problem could become a major irritant to some owners and will have to be remedied. On the other hand, there are occasionally floors that will squeak if someone so much as looks at them. Thankfully these are very rare occurrences and are usually the result of poor workmanship on the part of the installer. Either the incorrect material was used, it was badly fixed, or both. One of a number of ways to reduce squeaking is to introduce a lubricant such as French chalk, wax or some other non-staining lubricant between the cracks in the vicinity of the squeak. These measures occasionally give temporary relief and may be worth trying if the problem is only seasonal. However, the only permanent solution is to either provide additional support in the affected areas or to spread the load more evenly.

Where the underside of the floor is easily accessible, and the squeaking is not too widespread, short self tapping screws can be inserted between the boards (Figure 7). Alternatively, short lengths of joists can be introduced to support the sections of excessively deflecting boards. Proprietary metal joist hangers are extremely useful for this purpose. Packing pieces and wedges may be necessary too and must be firmly fixed in place if the problem is not to re-occur. If the floor is to be carpeted and the appearance of the flooring surface is not important, the boards could be re-nailed and punched and additional nails positioned to take advantage of the new stiffening joists.

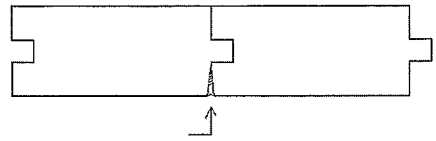

Figure 7. Self tapping screw in joint.

There are occasions of course when the underside is not accessible, for example, the upper floor of a two-storey house. In such a case the best solution is to take up the carpet and cover the entire floor area with hardboard. The hardboard should be fixed to the floor with self-drilling screws, ideally at centres of no more than 150 mm; this will have the effect of distributing the load and minimising or eliminating any deflection of the boards.

This solution is of course impracticable if the timber floor is to be exposed. Spot gluing may be worth a trial in such a case. The procedure is as follows:

1. At the spot where the squeak seems to occur, drill a hole of 6 mm or 12 mm diameter at the join line, with penetration only down to the top of the tongue

2. Using a clean, trigger-operated pressure oil can, inject into the hole a small quantity of urea-formaldehyde adhesive with hardener added, or a modified melamine-formaldehyde. The purpose is to bond the rubbing surfaces together. To ensure the bond sets properly, the treated areas should be left undisturbed for eight hours.

3. The holes may then be filled in the same manner as the nail holes.

As an alternative to the spot gluing of a floor with a multitude of squeak sources, the application of a liberal coating of one of the commercially available two-part polyurethane floor finishes could be trialed, providing it is compatible with the existing floor coating. Any excess material will tend to flow between the individual boards and bond them together, thereby increasing the overall stiffness of the floor. However, if shrinkage occurs, there is a risk of splitting the flooring and this alternative should never be taken until the moisture content of the floor has stabilised. Even then, the onset of a period of very dry weather may cause excessive shrinkage and create stresses in a large area of glued-floor in which case a fracture could occur at a weak spot. There is, unfortunately, a risk that such a failure will inevitably be at the centre of a board where it is most easily seen. However, that risk may be preferable to the original problem.

Timber is not a manufactured product and while most people appreciate timber flooring for what it is, a warm natural product, each piece with its own character and charm, some others expect it to conform to rigid and unrealistic expectations of colour, grain and dimensional stability that is not, and never will be possible or indeed desirable. For it to be so it would no longer be valued for what it is, a material with a beauty and life of its own that for thousands of years has and will continue to give us all immense pleasure and pride of ownership.

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