BRANZ

ISSUE 534 BULLETIN

OVERLAY FLOORING SYSTEMS OVER A SUSPENDED FLOOR

April 2011

Although overlay flooring systems are generally associated with concrete slab substrates, they can also be laid over a suspended floor.

Overlay flooring systems provide stable, hard-wearing floor finishes that are easy to lay and can be used in a wide range of situations.

This *Bulletin* focuses on the options for the selection and installation of these systems over suspended timber-framed floors with timber or sheet flooring.

1.0 INTRODUCTION

1.0.1 Overlay flooring systems can be laid over new suspended floors and can provide a suitable solution to the refurbishment of an existing sound timber board, plywood or particleboard floor. They can also be laid over sound floor finishes such as vinyl, cork, linoleum, rubber or ceramic tiles.

1.0.2 These systems can provide stable, hard-wearing floor finishes that are generally easy to lay.

1.0.3 Unless an overlay flooring system is specifically recommended by the manufacturer as suitable for wet area use, these systems should not be used in bathrooms, en suites or laundries, and because of the risk of wetting, selection of a suitable overlay flooring is required for kitchens and spaces containing a toilet pan.

1.0.4 This Bulletin covers the selection and installation of overlay flooring systems over suspended timber-framed floors with board or sheet flooring.

2.0 OVERLAY FLOORING TYPES

2.0.1 Overlay flooring systems available include:
- solid timber
- timber composite or engineered
- laminate
- bamboo.

2.1 SOLID TIMBER

2.1.1 Solid timber overlay flooring is available in matai, rimu, tawa, kwila, jarrah, beech, eucalyptus, cypress and oak. It typically consists of tongue and groove (T&G) boards that are 85 mm wide x 19 mm thick (12 mm and other thicknesses are available) designed for installation over an existing timber, particleboard or plywood floor.

2.1.2 Solid timber overlay flooring has similar durability and performance as timber boards laid over floor joists. The flooring can be susceptible to damage from:
- moisture penetration from above and below at joints
- point loads such as stiletto heels
- UV light, which causes discoloration.

2.1.3 Floors are typically finished on site with polyurethane or oil. Timber flooring may sometimes be available with a prefinished protective coating.

2.1.4 The wearing ability of timber flooring depends on the hardness of the species, for example, rimu is softer. It is able to be resanded to reinstate its appearance.

2.1.5 Recycled timber flooring is produced from old weatherboards, floor joists or other timbers including railway sleepers. The finish typically has defects such as nail holes. Recycled timber is generally cut as 12 mm thick (19 mm may also be available) T&G boards but is also supplied as 'dressed 4 sides' (i.e. without

Example of natural timber overlay flooring.

tongues and grooves) 9 mm thick boards. Non-T&G boards are laid butt-jointed and can sustain more sanding than thicker T&G boards, which can only be sanded down to the tongue.

2.2 TIMBER COMPOSITE OR ENGINEERED

2.2.1 Timber composite or engineered flooring consists of a top layer of thin sawn timber over one or more layers of timber, reconstituted wood fibre board or plywood. The layers provide greater dimensional stability than solid timber but maintain the look of solid timber.

2.2.2 Floors are supplied as planks or boards typically 13–15 mm thick with either interlocking or T&G edge and end joints. Also available are:
- two- or three-plank wide panels and parquet flooring
- bevelled edge to the planks to give the impression of a grooved, solid timber floor.

2.2.3 Floors are typically prefinished with a lacquer, which gives good durability and improved scratch resistance, or an oiled finish, which is better for enhancing wood grain.

2.2.4 They can be refurbished by sanding and recoating, for example, a 3.5 mm thick timber surface can generally be sanded 2–3 times to remove minor scratches or marks.

2.2.5 They are not typically recommended for use in wet areas.

2.3 LAMINATE

2.3.1 Laminate flooring, supplied as interlocking planks, typically 7–12 mm thick, has a top layer of a photographic image of timber grain over a core of timber or high-density reconstituted wood fibre board (RWB) with a melamine-based high-strength resin finish.

2.3.2 Laminate floors can be hard-wearing (some are said to be easily damaged), durable and have high UV resistance, and their layered composition gives good dimensional stability.

2.3.3 Laminate flooring with an RWB core is not usually suitable for use in wet areas such as bathrooms, laundries and toilets.

2.4 BAMBOO

2.4.1 Bamboo is manufactured into:
- engineered bamboo flooring (a thin bamboo veneer laid over a plywood base)
- solid bamboo flooring (vertically or horizontally laminated strips)
- reconstituted bamboo flooring (bamboo strands compressed into a plank).

2.4.2 Bamboo is typically available as 14–15 mm thick boards or planks with either interlocking or T&G edges and prefinished with a polyurethane coating.

2.4.3 Bamboo is claimed to have a similar hardness to many timbers, but like timber, it is hygroscopic and will move (swell/shrink) as the moisture levels change. It should not be used in wet areas.

3.0 SUBSTRATE PREPARATION

3.0.1 Before an overlay flooring is installed:
- the substrate must be sound, level, clean and dry
- loose, missing or damaged sections of flooring must be repaired or replaced
- all debris should be removed and the floor should be vacuumed to remove dust.

3.0.2 Check the condition of the existing flooring. The decision to install overlay flooring over an existing suspended floor is often because the floor is in poor condition.

3.1 SQUEAKS AND CREAKS

3.1.1 Eliminating squeaks and creaks in the substrate may require additional nailing or screwing of boards or areas of sheet flooring. Screw-fixing pulls the flooring more tightly to the joists and minimises vibration, which may be a more effective solution. Before renailing an upper floor, it may be necessary to prop the ceiling below to reduce any vibration generated.

3.1.2 Where nailing or screw-fixing does not fix the problem, installation of additional subfloor support may be required.

3.1.3 For upper floors, solid blocking or strutting may need to be added to stiffen the floor. As a last resort, consider installing additional beam support.

3.2 MOVEMENT

3.2.1 If a ground floor is springy or bouncy (excessive deflection) and there is reasonable access underneath, the best solution is to increase structural support by installing additional piles, bearers and/or floor joists.

3.2.2 For upper floors with excessive deflection, remedial options are more limited. If the ceiling below can be removed, additional framing may be able to be inserted in the space to stiffen the framing. Alternatively, the installation of a beam under the ceiling/floor above to reduce the span of the joists may avoid removing the ceiling lining. Any beam will require supporting end posts that may need additional support at ground level. If these options are not viable, the existing flooring may need to be removed in order to gain access to the floor space so additional framing can be inserted from above. If this is the case, new flooring may mean that overlay flooring is not required.

3.3 SUBSTRATE CONDITION

3.3.1 Maximum unevenness across the substrate should be no more than 3 mm over 3.0 m in any direction, and there should be no sudden deviations greater than 1 mm over 250 mm.

3.3.2 Machine-sand raised areas to make the floor level and fill depressions with levelling compound. Severely cupped or bowed boards – usually as a result of high moisture levels below the floor – may need to be replaced.

3.3.3 If the existing flooring has become thin due to over-sanding, the ability of the existing floor to span between joists will need to be confirmed before the overlay is installed.

3.3.4 Where there is existing flooring such as tiles, linoleum or vinyl, check that the overlay can be laid over it. Where the finish is in poor or worn condition or not flat enough, it should be removed.

3.3.5 Where the existing flooring has been damaged by moisture:
- the source of the moisture needs to be rectified
- the damaged flooring should be replaced
- the condition of the supporting joists should be checked for damage.

3.4 MOISTURE LEVEL OF FLOORING

3.4.1 Although an existing suspended floor is unlikely to have a high moisture content, check the moisture level of the substrate before installing overlay flooring. Substrate moisture levels must not be higher than the recommended moisture level for the overlay flooring, and there should be no more than 3% difference in moisture content between the flooring and substrate at laying. Species such as American oak and most Australian timbers require the moisture content of the substrate and the flooring to be the same when the new floor is laid.

3.4.2 Typical moisture contents for:
- air-conditioned/centrally heated buildings: 8–12%
- intermittently heated buildings: 10–14%
- unheated buildings: 12–16%.

3.4.3 If the substrate has a high moisture content, the subfloor should be checked to determine the cause. Ensure that the subfloor is well ventilated and that the soil is not wet. If there is evidence of subfloor moisture, inspect the space to see if the source of water is from leaking pipes, wastes or drains and repair leaks as required. Alternatively, groundwater drainage may need to be addressed by covering the ground with polythene or installing additional subfloor ventilation openings.

4.0 ACCLIMATISING/CONDITIONING

4.0.1 Overlay flooring must be left to acclimatise according to the manufacturer's recommendations in the room or space where it is to be laid to allow it to reach the same temperature and moisture level as the surrounding environment. Note: The recommendation for acclimatisation is for solid timber.

4.0.2 To assist acclimatisation, order the flooring at the required moisture content if possible. Manufactured products are typically supplied at relatively low moisture contents so will generally swell when exposed to the air. Packets of flooring may need to be opened – check with the supplier or manufacturer, as not all recommend opening the packets, particularly where the in-use moisture conditions are too high, as the space needs to be dried before the timber is opened then laid. Timber, laminate and bamboo planks may need to be fillet stacked to allow full air circulation around the flooring for the conditioning period.

5.0 INSTALLATION

5.0.1 Ideally, existing skirtings, architraves and doorway thresholds should be removed before installing overlay flooring. If the project is a new construction where the overlay is installed over new particleboard, skirtings and architraves should be fitted after the installation of the flooring.

5.1 INSTALLATION METHODS

5.1.1 Overlay flooring systems can be laid directly over a suspended floor substrate using either a floating or adhered method of installation.

5.1.2 A floating floor consists of planks or boards with interlocking edges that can be joined and locked together to create a single unit (Figure 1) and laid over the manufacturer's recommended underlay, typically 2 4 mm thick. The joints generally do not require gluing, and the floor effectively 'floats' over the substrate. The underlay may:
- minimise very minor subfloor variations in flatness
- make the floor more comfortable to walk on
- provide a DPM
- absorb sound from footfalls (druminess) and prevent noise transmission through the floor.

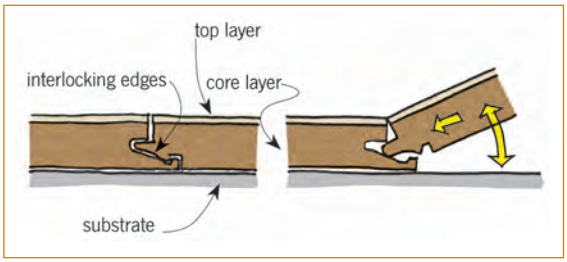

Figure 1: Interlocking flooring system.

5.1.3 For a fully adhered floor, adhesives used to fix the overlay flooring to the substrate must be appropriate for the substrate and the flooring material. Application should be in accordance with the manufacturer's instructions, particularly with regard to coverage, application, temperature and exposure times to ensure the flooring is fully bonded to eliminate the possibility of druminess in the floor.

5.2 EXPANSION GAPS

5.2.1 All overlay flooring systems must be laid with a continuous gap around the perimeter of the floor and fixed obstacles to allow for expansion. Gaps typically range between 8–22 mm but the actual size depends on the type and area of the flooring and should follow the manufacturer's recommendations (see Table 1).

TABLE 1. SUMMARY OF NON-TIMBER OVERLAY FLOORING PROPERTIES					
		Solid timber	Composite timber	Laminate	Bamboo
Suitability	Residential	✓	✓	✓	✓
	Commercial	✓	✓	✓	✓
	Wet areas	✘	✘	Manufacturer's recommendation only	✘
Installed over underfloor heating		Specific design	Manufacturer's recommendation only	✓	✓
Fixing	Floating	✘	✓	✓	✓
	Glued	✓	✓	✘	✓
	Nailed	✓	✘	✘	✘
Finish	Prefinished	✓	✓	✓	✓
	Unfinished	✓	✘	✘	✓
Typical plank dimensions	Width (mm)	65–180	130–220	100–200	92–190
	Length (mm)	Varies	1400–2400	1200–2000	920–1900
	Thickness (mm)	12	12–15	7–12	14–15
Expansion gaps (mm)		8–10	8–10	1–2 mm/lineal metre	12.5 min
Features	Interlocking boards	✘	✓	✓	✓
	Accessories available	✘	✘	✓	✓
	Good stability	✘	✓	✓	✘
	Sustainable	✓	✓	✓	✓

Expansion gaps are generally concealed by skirting boards, toe spaces under fittings and other trims.

5.2.2 Expansion joints may be required along the length of the flooring where large areas are being proposed.

5.3 INSTALLATION GENERALLY

5.3.1 Boards should be laid in a randomly staggered configuration. Select adjacent planks from different packets or batches to ensure the finishes are well mixed. Stagger the end joints of planks of adjacent rows (150 mm to 400 mm minimum depending on the supplier) – more is preferable so that end joints are not concentrated in one area.

5.3.2 Before laying the floor, determine the direction that the planks or boards will run. Consider factors such as the natural light that falls along the length of the boards, running boards parallel to the longest wall and other visual considerations for the finished floor.

5.4 SOLID AND RECYCLED TIMBER

5.4.1 Solid and recycled timber overlay floors can be adhered (the preferred option) or nailed to the substrate. Installation procedures include:

- checking the moisture levels of both the substrate and the flooring
- handling boards carefully to avoid damage to board tongues
- protecting board edges when cramping
- sealing the edges, ends and faces of the boards before installation.

5.4.2 When adhesive fixing:

- Apply adhesive with appropriate tools at the recommended rate. Take into consideration the substrate porosity, ambient temperature and relative

humidity. When a notched trowel is used, the adhesive ridges should be at right angles to the long edge of the timber. Do not use gunned-on adhesive.
- Tap each board into place to ensure that the tongue of the board is well fitted into the groove of the adjacent board. Tap on a packer over the board, not directly onto the board.
- Press boards firmly into the adhesive to give full contact with the adhesive.
- Cramp boards as required.
- Apply weight until the adhesive is fully cured.
- Do not walk on the floor for at least 48 hours after laying to allow the adhesive to cure.

5.4.3 When nailing (Note that some manufacturers recommend adhesive fixing only):
- Use annular grooved nails that are 2.5 times longer than the board thickness.
- Keep the floor weighted while nailing to maintain a tight fit.
- Boards may be secret nailed, but boards wider than 85 mm should be adhered and preferably secret nailed.
- Punch nails below the surface where boards are top-nailed.

5.4.4 After installation, nail holes should be filled and the flooring should be sanded to ensure joints are level and machine marks are removed from the timber surface.

5.4.5 Unfinished timber floorboards may be finished with a floor oil or a minimum of three coats of moisture-cured polyurethane. If the flooring is prefinished, apply a further coat of moisture-cured polyurethane or oil.

5.4.6 Lay softboard sheets or other soft protective material to protect floors from damage during construction work and even after any finish coating has been applied.

5.5 TIMBER COMPOSITE FLOORING

5.5.1 Full adhesion to the substrate is recommended by some suppliers although it can be laid over an underlay as a floating floor. For both options follow the supplier's recommended instructions.

5.5.2 If the flooring is prefinished, it can be walked on immediately after laying. If the flooring is not prefinished, follow the finishing procedures for solid and recycled timber floors.

5.6 LAMINATE FLOORING

5.6.1 Laminate overlay flooring is generally supplied as interlocking boards or planks and installed as a floating floor laid over an underlay. Incorporating some form of damp-proofing under the flooring overlay is recommended.

5.6.2 Include expansion gaps of a minimum of 8–10 mm around the perimeter of a room and at any fixed obstacles such as columns and door frames. An allowance of 1.4 mm per metre may need to be allowed for longer flooring runs.

5.6.3 Laminate flooring is supplied prefinished with a high-strength resin coating and can be used immediately after laying.

5.7 BAMBOO FLOORING

5.7.1 Bamboo overlay flooring is supplied as T&G flooring that is installed by gluing or nailing, or as interlocking planks installed as a floating floor.

5.7.2 A floating floor can move as a single unit independent of the substrate. It must be installed over an underlay and a dry substrate, as bamboo is sensitive to moisture movement. Potential sources of moisture must be identified and remediated – where a risk remains, the flooring should be laid over a waterproof membrane.

5.7.3 Allow a minimum expansion gap of typically 12.5 mm around the perimeter of the room (although this may vary with room size and the specific bamboo system). Large floors should have expansion gaps within the floor as well as at the perimeters – proprietary 'T' expansion joints are available for this. If the floor dimension in any direction is greater than 4.8 metres, allow a 3 mm expansion gap for each 1.2 metres of extra length. Where a floor is longer than 12 metres in one direction, provide additional expansion gaps as recommended by the supplier.

5.7.4 Bamboo flooring is typically prefinished with a polyurethane coating, and it can be walked on immediately after laying.

6.0 CLEANING AND MAINTENANCE

6.0.1 Clean floors with soft-bristle vacuuming or a microfibre mop. Marks and spills should be cleaned immediately.

6.0.2 Use water sparingly to clean (unless the flooring is suitable for wet areas) as moisture can cause swelling if it gets into the board joints and the substrate. Avoid using detergents, scouring cleaners, steam mops, waxes and polishes unless specifically recommended by the manufacturer.

6.0.3 To prevent damage, it is advisable to:
- use door mats on both sides of exterior doors
- remove sand or other abrasive substances as soon as possible
- fit furniture with felt pads
- ensure heavy objects and furnishings have their weight distributed over the area of the object, not on point loadings such as legs or castors
- check the manufacturer's recommendations for maximum weight of objects to be supported on the floor.

6.1 TIMBER

6.1.1 Natural timber floor finishes must be protected from dirt and moisture and should generally be treated the same way as a solid timber floor.

6.1.2 Where there is an oiled finish, retreatment with oil wax should be carried out according to use and the manufacturer's recommendations as follows:

- Public areas: 1–5 years.
- Residential areas: 5–10 years.

6.2 REPAIRING SCRATCHES AND MARKS

6.2.1 Timber floors may be sanded and recoated with polyurethane or oil. Colour-matched hard wax may be used for small repairs

6.2.2 Laminated and bamboo floors can be treated with an appropriately colour-matched filler.

6.2.3 Systems with interlocking boards may have damaged boards removed and replaced.

7.0 FURTHER READING

- BRANZ Bulletin 330 *Thin flooring materials* – (2) *Preparation and laying*, February 1995, BRANZ Ltd, Judgeford.
- BRANZ Bulletin 506 *Laying solid timber strip flooring on concrete slabs,* December 2008, BRANZ Ltd, Judgeford.
- BRANZ Bulletin 513 *Timber composite overlay flooring,* August 2009, BRANZ Ltd, Judgeford.
- BRANZ Bulletin 521 *Squeaky floors,* April 2010, BRANZ Ltd, Judgeford.

BRANZ

THE CORE PURPOSE OF BRANZ IS TO IMPROVE PEOPLE'S LIVES THROUGH OUR RESEARCH AND OUR DRIVE TO INFORM, EDUCATE AND MOTIVATE THOSE WHO SHAPE THE BUILT ENVIRONMENT.

BRANZ ADVISORY HELP LINES

FOR THE BULDING INDUSTRY
0800 80 80 85

FOR THE HOME OWNER AND PUBLIC ENQUIRIES
0900 5 90 90

Calls cost $1.99 per minute plus GST. Children please ask your parents first.

HEAD OFFICE AND RESEARCH STATION
Moonshine Road, Judgeford
Postal Address – Private Bag 50 908, Porirua City 6220,
New Zealand
Telephone – (04) 237 1170, Fax – (04) 237 1171
http://www.branz.co.nz

Standards referred to in this publication can be purchased from Standards New Zealand by phone 04 498 5991 or by visiting the website: www.standards.co.nz.

Please note, BRANZ books or bulletins mentioned in this publication may be withdrawn at any time. For more information and an up-to-date list, visit BRANZ Shop online: www.branz.co.nz or phone BRANZ 0800 80 80 85, press 2.

ISSN 1170-8395