

# Surface finishes for concrete slabs

## How to avoid moisture problems

In Australia more and more concrete slabs are being used due to the increasing awareness of their thermal properties, especially where the climate is cool or there is a high day/night temperature range.

Most of these slabs will be screeded, helicoptered, vibrated, ground back in one way or other before the final grind or sealing takes place. Having worked in the building industry for over 12 years here in Melbourne, and many more years overseas in Europe, we are finding that there is a growing number of problems arising from this process.

Often this is due to the increasing demands and deadlines placed on the building professionals in the construction industry and unrealistic expectations from the inexperienced. These problems commonly stem from too little time being allocated to allow for the concrete slab to thoroughly dry out before the need for sealing or covering.

### BY ANGELA PETRUZZI

There can be substantial damage caused to various coverings or coatings when applied to a concrete slab too early, caused due to the inevitable curing of the concrete whereby residual moisture slowly rises to the surface within the slab. This damage can range from delamination of pre-finished boards, bonding failure of adhesives,

deterioration of coatings and even microbial growth.

Coatings and finishes for concrete slabs are relatively new, with many having only been on the market for a short time. Combined with building practices, concrete substrates, deadlines and expectations of the final finish, this can often lead to a disappointing result.

### The slab itself

You must ensure that the slab is sufficiently dry for the covering or coating selected. Manufacturers of various flooring systems often suggest a humidity or moisture test be carried out prior to installation or application.

Many do not recommend moisture sensitive coverings or coatings be applied if damp proofing has not been carried out underneath the slab. This damp proofing membrane is installed underneath the slab

1. *White oxide was added to the concrete mix. Later ground and burnished showing the aggregate. Oiled with Livos white oil.*
2. *Full exposure. Ground back to the aggregate and oiled with clear oil. Coloured glass, shells or other pebbles can be added to the concrete to achieve various looks and colour.*



and ensures that moisture released from the slab can only move one way, usually upward into the home. It also prevents any moisture in the soil below the slab from migrating into the slab at a later time.

If there is further restriction in the moisture evaporation by, for example, covering the slab with plastic or sealing with a watertight sealer before properly dried, this can lead to huge problems with floor coverings lifting or adhesives peeling when the moisture eventually finds its way out.

More water, also, is now being added to the concrete mix than many years ago to allow the mix to be more 'flowable.' Another issue that restricts the drying of some slabs is the fact that they are excessively worked on to create the popular burnished finished. This is like forming a hard crust on the surface, which then makes the surface resistant and difficult for moisture to escape.

Due to the thickness of the slab, consideration must be given to the moisture content of the whole slab and not just the surface, as any moisture left deep in the slab (even if the surface appears dry) will eventually move up and can compromise the final finish or coatings applied.

#### WAYS TO REDUCE THE RISKS

- Use a concrete mix with low water content.
- Allow sufficient time for the concrete to dry.
- Ensure the evaporation of moisture is not hindered.

- During construction, ensure the damp proofing membrane is protected from puncture or damage.
- Use breathable coatings (vapour permeable) if possible, this allows any residual moisture to evaporate through.
- Remember when using heaters or airconditioners that dry the slab quickly, the surface may dry but not necessarily deep into the slab.
- Do not apply coatings if room temperature is below 10–12 degrees.
- Test sample products if possible. The actual surface imperfections may be highlighted in ways you are not expecting.
- If the surface must be washed, allow enough time for this to dry prior to coating. Abrasive sanding or blasting is recommended to achieve an even finish.
- If voids need patching, ensure this is completed early on to allow sufficient time for these to dry and if necessary, to be sanded or ground.

#### Concrete surface finishes

There are various options available when considering the final look and finish of your concrete floor, but it all

3. *Helicopter marks left on the surface. Only grinding back will remove these marks.*
4. *Nil exposure. Use of a transparent oil will highlight the actual colour of the surface finish, deepening the colour of the surface and assisting in heat absorption.*



### Thermal mass

'Thermal mass is the ability of a material to absorb heat energy. A lot of heat energy is required to change the temperature of high density materials like concrete, bricks and tiles. They are therefore said to have high thermal mass. Lightweight materials such as timber have low thermal mass. Appropriate use of thermal mass throughout your home can make a big difference to comfort and heating and cooling bills. This fact sheet shows you how.'

For a full explanation of how thermal mass works and where to locate it, see Your Home Technical Manual, Passive Design, 4.9 Thermal Mass [www.yourhome.gov.au](http://www.yourhome.gov.au)

starts off with a good slab. Also keep in mind when working out budgets and timing that, whilst you may be a wiz with some machines, at times it is more cost effective to allow the professionals to do their bit. (See pic 3)

The slab should be poured evenly and then helicoptered (powered trowel). The concrete is later ground to level the surface prior to sealing or polishing.

#### FULL EXPOSURE

As the name suggests, with full exposure the usual grey concrete is ground back by several millimetres to expose whatever aggregate exists within the slab.



How much grinding needs to take place will be dependent on the requirement of the final look and the condition the concreter has left the slab in.

Often the aggregates and sometimes the colour (e.g. by adding oxides) are selected to ensure a desired end effect. This needs to be considered very early in the planning stage with the concrete supplier. (See pic 1 & 2)

#### **RANDOM EXPOSURE**

Again the concrete is ground back, but perhaps not as far, with an uneven exposure of the aggregate. Many prefer this finish as it shows the character in the surface. It often has a patchy or motley look. However, if possible, imperfections such as footprints should be eliminated.

#### **NIL EXPOSURE**

Here no aggregate is left showing; sometimes this is referred to as a salt and pepper finish. The slab should be poured evenly and then burnished, including close to the edges (there is less chance of this being carried out if the day is wet as the concreter cannot work with the helicopter).

All footprints and screed marks must be eliminated. Vibrating the slab assists in the aggregate sinking lower with less chance of it being exposed during the final grinding or sealing. (See pic 4 & 5)

#### **WAREHOUSE FINISH**

This is the look that is achieved from grinding old slabs. The finish is often

5. Completed floor showing the variations in the surface.

6. Patchiness arising from the application of a penetrating oil prior to removing the synthetic coating.

varied, uneven, shows a cracking effect and has visible signs of other damage from previous paints and sealers. It is impossible to know the final result with older slabs as the top 3–4mm of the surface is usually ground off.

Depending on the amount of grinding, more aggregate may be exposed; this can also result in nests of aggregate, however many find this creates the unique surface appearance that is desirable from old slabs – character. This is the finish we had with our 30-year old factory slab.

### **Oiling of the surface**

Somewhere along the line, you will need to consider the coating or sealing you will choose to use on your slab. The options are many and varied. To eliminate heartache, or at least reduce it, research the products and test them on your slab. Test in inconspicuous areas such as where cabinetry will be installed, especially if you want to use a stain. As each slab is unique the resulting surface finish is very dependent on ‘your’ slab and how it has been prepared. Also keep in mind, you often cannot achieve the same look as a glossy magazine picture. Finally,

if all doesn’t go as expected, be willing to compromise on your expectations.

Good communications right from the beginning will assist, but not always guarantee, the look that you want. It is imperative that you keep in good contact with your builder and/or concreter to ensure that the slab is laid according to the finish that is desired.

If oiling, make sure this is carried out at the end of the building process when all trades have finished. If a water based coating has been applied to the slab for protection, it will be necessary for this coating to be ground off to guarantee correct penetration of the oils. (See pic 6)

If this is not an option, even working the surface with a buffing machine and screening it will remove paint residue and building plaster etc.

We oiled our 30-year old concrete floor three and a half years ago with the *Livos* natural penetrating oils. We were not only conscious of using a healthy product, the durability and maintenance were also extremely important.

*Ed’s note: See TOB 168 Dec 2011/Jan 2012 ‘Natural finishes for concrete floors’ for an article on this process. ♦*

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