Avoiding cracking in concrete floors and walls

CCANZ Regional Engineer, Dene Cook provides some tips.

Going crazy over crazed cracking?

Just finished a concrete floor or wall and you can see hexagonal cracks that are about 5-75mm across on the surface. You now have a client who is quizzing you on what caused this and whether it will get worse? The answer, to a certain extent, depends on what caused the cracking, and the use of the concrete floor.

In this article we will look at crazed cracking – exploring what it is, the causes, and the significance of it in terms of future performance.

Crazed cracking

Crazed cracking consists of fine cracks, often less than 0.3mm wide, which appear on the concrete surface as irregular hexagonal shapes, refer photograph. The cracks often resemble roads on a map so are sometimes referred to as map cracking. The depth of cracking is 2-3mm at the most. If the depth is greater than this the cracking is not strictly crazed cracking.

The cracking may be more obvious in trafficked areas, where dirt forced into the cracks often makes them more conspicuous. They can also be more obvious in concretes made with white cement simply due to greater colour contrast between the cracks and the concrete.

What causes crazed cracking?

There are many combinations of placing technique and mix design that can increase the incidence of crazed cracking. However, the underlying cause is where surface tensile stresses develop due to differential shrinkage of the surface relative to the body of the concrete. This differential shrinkage may be caused by

- Over trowelling which can create a thin layer of cement rich paste on the surface which will shrink more than the concrete below
- Working the bleed water into the surface. If trowelling commences too early then bleed water can be mixed into the surface creating a surface with a higher water content
- Using cement to mop up the bleed water
- Incorrect use of specialist dry shakes
- Intermittent curing allowing the surface to get wet and dry
- Smooth low permeability formwork
- Climatic conditions – the most important climatic conditions are relative humidity and temperature during the drying period. The lower the relative humidity and temperature the more severe the conditions.

Is the condition terminal?

It is generally accepted that crazing is a cosmetic problem. There is much anecdotal evidence of industrial floor slabs that exhibit crazed surface cracking which have been in service for many years without deterioration. Autogeneous healing of fine cracks can occur, though, although 'healed' the cracks will still be visible.

Deterioration problems can occur when the cause of the cracking was working the bleed water into the surface. This can result in a surface that dusts and does not have the desired abrasion strength. If the cracking was caused by moving cement paste around the surface to hide defects, delamination is probable. In situations where freeze thaw is a common occurrence the depth and width of the cracks should be considered. In most instances the cracks are thin and shallow and therefore unaffected by freeze thaw cycles.

How to avoid crazed cracking

Crazed cracking is difficult to avoid as in many instances the desire to get a good hard surface by steel trowelling can result in a crazed surface. However, cracking can be reduced by-

- Avoiding the use of very wet mixes
- Do not trowel until the bleed water has gone
- Continuously cure, do not let the surface wet and dry
- Do not use 'driers'
- Avoid overworking the surface.