ARCHITECTS MEMO
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a mine of information

Many years ago, I was called by an alleged burglar, who was conducting his own defence, as an expert witness. The Crown was claiming that a flake of paint, found on a tool in the accused's possession, was chemically identical to paint on the burgled premises.

The accused, quite rightly as it happened, argued that many paints (at that time) were made to Government specifications and it would be impossible to tell the difference between two paints made by different manufacturers, but to the same specification. What did put him away, however, was not the chemical analysis but the sequence of the layers of colours in the paint flake that was identical to the system on the building.

The layers of paint that build up over the years of a building's life give insights, not only of developing technologies but also of changing fashion trends.

There are a couple of drivers for wanting to know about what lies underneath the paint surface (apart from apprehending felons), the most common being "will the existing system be compatible with my proposed repainting choice?" To be perfectly honest, there would be fewer heartaches if this question was asked in a timely manner - the reality for most is "The old paint was perfectly sound until I applied the new paint – now look at it!"

There was a long era in coating technology when, for exterior paints, linseed oil reigned supreme; originally pigmented with red lead for primers and white lead for topcoats. Because of linseed oil's high level of unsaturation it has the remarkable ability to 'dry' when exposed to air. Unfortunately, this hardening doesn't just stop when useful film properties are achieved but carries on, slowly, over the years until the films become extremely hard and brittle.

The next technological step was to use synthetic, solventborne resins called alkyds. Initially these were still based on linseed oil but the embrittlement was somewhat reduced. Modern alkyds used for wood primers are based on semi-drying vegetable oils (such as soya oil) with the philosophy of trying to minimise the level of unsaturation in order to achieve useful drying times with a minimum of long term embrittlement.

100% acrylic primer binders contain no unsaturation and their long term embrittlement is negligible.

The application of any new coat of paint induces some degree of stress as there is invariably some contraction moving from the liquid to the solid state. The stress can be dramatically magnified if the repaint is accompanied by a significant colour change. The move to a darker colour, which will absorb heat from the sun in exposed areas, can add intolerable stress to an aged and infirm primer. While IR reflecting pigments will significantly reduce the heat build-up of a system, success or failure of the repaint will depend on how degraded the existing primer is.

In making the initial assessment of the existing paint system, any sign of flaking should be taken as a sure sign of primer degradation. Without any visible signs, it is recommended to do a 'tape adhesion test', details of which can be had from Resene. Failure of this test indicates the need to completely remove the existing system back to a bare substrate.

This is an expensive business but the 'grit your teeth' reality is that, eventually it will have to be done. To compound the difficulty, the old system may be comprised of some lead-based paint. This needs to be tested for prior to stripping so that the appropriate containment measures can be put in place.

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There is another potential trap lurking underneath the paint surface, an issue that was created between the mid-sixties to the mid-seventies. This period saw the advent in New Zealand of the gloss latex paint. These paints were based on polyvinyl acetate co-polymers with very low levels of pigment. The initial materials proved to be extremely thermo and hydroplastic, that is, they softened significantly in the presence of either heat or moisture and dramatically in the presence of both. However, apart from some dirt pick up issues, they worked reasonably well as finishes.

Problems can still occur now and then, where such paints have been overcoated, particularly with darker colours. If after prolonged rain, such a system is rapidly warmed in the sun, the softened gloss latex can be literally 'blown apart' as the moisture within it vaporises. A characteristic blister is formed in which both the top and the bottom layer of the blister consists of the same glossy paint; generally white and with a characteristic topography. When this happens, it is best to pour oneself a stiff gin.

The other major reason for delving below the paint surface is not so gloomy but is driven by the wish to know how the building looked at the time that it was built.

Modern analytical methods are continually pushing the limits of what can be determined by the chemical constituents of various materials and artifacts, however, often all that is needed to be known is the colour. Cross sections of paint flakes do not present a large enough sample for the colour to be precisely determined using a spectrophotometer, however a good paint inspection microscope in the hands of a good colour matcher will get pretty darn close to what the original colour/concept was meant to be.

I must admit to being somewhat of a heretic in this area. Knowing something of the history and availability of paints in our early days, colour scheme concepts necessarily had to be restricted. What colour schemes would our early designers have used if they had our current palettes available? Probably nothing like what they were compelled to use then!