50 shades of !!!

Our last memo introduced a little pigment technology and touched on some of the reasons why certain pigment chemistries are inherently more durable than others. In this memo I thought that we could look at how these chemistries affect mixtures of these pigments, as found in the vast majority of paint colours offered.

It is fair to say that in mixtures, typically pigments don't interact with each other per se (in the sense that there are beneficial or negative chemical reactions) but, that each sit within the film; each interacting with its immediate environment – predominantly solar radiation. It is differences in rates of these interactions, which creates the illusion of pigment incompatibility.

Before shedding some light on the above by way of examples, let us re-state a basic rule, "because paint pigments work by absorbing the majority of the visible spectrum and only by reflecting in one, specific colour wavelength, colours achieved by pigment mixtures will always be duller (less saturated) than the same colour achieved by a single pigment (chromophore).

This is not necessarily a bad thing, as subtle complex colours are created by such pigment mixtures, but it is a golden rule nonetheless.

Every paint manufacturer's tinting system will contain as their main (and often only) green, a pigment based on phthalocyanine chemistry. As long as the pigment is purchased from a reputable supplier, such tinters should be uniformly durable. Let us have a look at a target colour which is a bright yellow/green, the main pigment of which will be phthalo green. The desired shade may be reached by either (a) adding a significant amount of yellow iron oxide (yellow ochre), (b) adding a small amount of the mixed metal oxide bismuth vanadate, or (c) adding a small amount of organic yellow PY74.

It is actually unlikely that the (a) option would obtain the necessary brightness but, if the colour were accepted, prolonged exposure would see the super durable yellow iron oxide prevail, and the colour would become yellower as the phthalo green eventually faded. Option (b) would achieve the necessary brightness and, because of the excellent durability of the mixed metal oxide, the shade will be maintained for many years. Rotorua could provide the exception – but that is another story!

Option (c) is the tricky one. In interior situations this relatively cheap organic pigment will produce a beautiful, durable colour, but, put outside, the yellow will fade within the year, resulting in a return to the basic, phthalo green shade.

There are many, much more obvious examples – greens and bordeauxs that turn blue, pinks that turn white, the list goes on. The golden technical rule is only blend pigments of like durabilities. The major dilemma is – how is the layman or (laywoman) supposed to know?

Frankly, I have no idea. I believe that it helps to know that such problems can and do exist and that a simple tonal colour match that seems to look the same tells one nothing about covering power or durability of the shade produced. My best advice is stick with what you know works.