ARCHITECTS MEMO
by Colin Gooch, Resene Technical Director

No. 116: August 2014

six shades of grey

I have probably banged on about the shortcomings, with regards to hiding power, of organic yellow, orange and red pigments as compared to the obsolete lead chromate pigments, to the point where you (gender neutral) guys could write an 'Architects memo' on the subject yourselves!

Poorer intrinsic hiding power demands more coats to achieve obliteration and one initiative that Resene took was to supply undercoats in all of our colour range so that the undercoat could be included in the 'hiding' package.

In 1982 I wrote a memo, 10 years on from their introduction, that 'Coloured Undercoats are important!' And I was right, undercoats are important (providing hiding, filling and a smooth dense surface to achieve maximum topcoat performance) but these benefits have often been dropped for the convenience of one product systems. While coloured undercoats did improve system hiding, if the system was inherently poor in hiding, the coloured undercoat benefit was incremental.

At Resene, we were groping our way towards a new concept when we developed an undercoat for our newly introduced durable magenta colours. The pigment cost for the topcoat was horrendous so, for the undercoat, we used a much duller, high hiding, bluish red iron oxide. This worked beautifully, even though the colour of the undercoat was a very poor match for the topcoat.

It took the majors in the automotive paint industry to fully develop this concept, coupled with the fact that our eyes, although sensitive, can be relatively forgiving.

Lack of hiding is perceived because visible light can transport through a film, hit the substrate and then transport back out of the film such that the observer 'sees' the substrate. It is the pigment's job to absorb, reflect, refract or diffract this light so no images of the substrate reach the observer's eye.

Titanium di-oxide is the best reflector, refractor and diffractor of light and carbon black is the mother of all electromagnetic wave absorbers. It is, therefore, understandable that greys make the best hiding paints. What the automotive guys found was that, providing the grey substrate is uniform, there is a specific shade of grey which enhances the perceived hiding of any coloured topcoat.

For the actual mathematics of how this works and how the shade of grey is calculated for a specific topcoat, you'll have to ring Tunis Cook – our Colour Systems Manager but, you can take my word for it, it really works. Extensive laboratory work has shown that rather than offering an infinite number of greys, a graduation of six (well one white and five greys) works quite nicely.

We were about to take these 'varishades' to market when Ajith Manapetty, the chemist who drives, among other things, our 'CoolColour' programme, pointed out that this initiative was working against 'CoolColour' efficiency.

Let me explain. CoolColours work by replacing heat absorbing pigments with heat reflecting pigments. However, there are several colours (bright blues, greens, magentas, purples) which have poor 'hiding' for infra-red rays. Although our eye doesn't see it, infra-red rays can pass through many colours and impact on what is underneath. If what is underneath is IR reflective, then the heat gets bounced back out. If, however, the substrate is IR absorptive, then the surface will heat up. This is why it is always best, under a 'CoolColour' system, to use a white undercoat.

As I mentioned earlier, carbon black is the mother of all absorbers, so the use of carbon black tinted undercoats, under IR transmitting colours, will lead to heat build-up.

Upon Ajith's insistence, we re-formulated our waterborne 'varishade' undercoats to provide an alternative to carbon black and by using our mixed metal oxide 'Cool Black' technology, everybody can now can relax!

So go on! Pour yourself another glass!

In Australia:
Call 1800 738 383
visit www.resene.com.au
or email us at advice@resene.com.au

Resene
the paint the professionals use

In New Zealand:
Call 0800 RESENE (737 363)
visit www.resene.co.nz
or email us at advice@resene.co.nz