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the unfolding story of sustainability

We introduced the topic of sustainability in Memo No. 90 and firmly drove our stake into the ground. We stated that "we believe that our (Resene's) best contribution to sustainability is to offer longevity (of paint systems) and thus reduce the need for repainting". The stake remains resolutely in place but the amount of ongoing activity occurring in this space merits a meaningful memorandum – or so my team tells me.

This memo will confine itself mainly to developments in the area of paint binders where the majority of effort is being focused.

Renewable binders are nothing new to the paint industry. Linseed oil is the original 100% solids; VOC free; 100% renewable paint binder. Oil modified alkyds, such as are used in gloss enamels typically contain about 65% of renewable soya oil. The other 35% is predominantly non-renewable material but the main issue is that it has to be delivered in hydrocarbon solvents.

Waterborne alkyds have been around decades – introduced to the market at about the same time as PVAs made their appearance – but water and alkyds did not make for a happy marriage. There were problems of stability; drying and colour (yellowing) and, in most areas of the world, dispersion polymers (PVA co-polymers, acrylics, styrene acrylics) displaced them.

Improvements to the waterborne alkyds were only achieved by lowering the oil level and increasing the synthetic components; making them less attractive as sustainable binders.

Europe, particularly France and Italy, have not taken as readily to acrylic enamels, as have America and Australasia, preferring to stick with traditional alkyds. Regulation has spurred a lot of novel developments in the waterborne alkyd area and interesting products are becoming available that may change the paradigm.

Soya bean oil remains an interesting raw material, emerging as a building block for new chemistries other than bio-diesel. ADM market a soya oil based coalescing agent that assists in the film formation of dispersion polymers replacing non-sustainable alternatives. Recognising the potential importance of this, resin companies are attempting to develop resins optimised for the new coalescents and nice synergies are developing.

Dow has used soya oil to offer some novel co-binders for polyurethanes. These new polyols claim to have automotive grade durability but with another useful, although perhaps serendipitous, property. It is claimed that the micro abrasions caused, for example, by car washes will relax and virtually disappear with time.

Dow has also announced a bio-based, phthalate-free plasticiser, initially for use in PVC cables, but promising to be available for other uses, including coatings, at a later date. Dow has not at this stage revealed the chemistry.

Acrylic and vinyl monomers are almost exclusively based on starting materials from the petroleum industry but there are vigorous efforts being made to produce them from other routes; and with some success. Glycerine is a by-product of the bio-diesel industry and this has been used to produce monomers, as has ethanol from bio fermentation processes. A novel method using enzymes has also been pioneered in Germany.

Such monomers already exist but, as amounts are as yet relatively small, they are being fed into the general supply and no specific claims are able to be made for individual brands.

Most major chemical companies in this area are taking a fairly pragmatic approach. The production processes for bio-based materials need to stack up against their petro-based counterparts. They will not use a bio-based starting point if it takes twice the carbon footprint to achieve their aims. The moral issue of using foodstuffs for production of chemicals remains in focus.

Resene has a vested interest in this whole area; not only because we are keen to improve the sustainability of our products but because we have a million dollar programme underway to develop ultra-sustainable paint binders: but more of that in the unfolding chapters. And while those chapters are unfolding, we've started the ball rolling using some new renewable raw materials in the form of waterborne alkyd technology to formulate Resene EarthSense ceiling paint.

In Australia:
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What is a Renewable Raw Material?

A Renewable Raw Material (RRM) is a raw material obtained from a renewable natural resource. A natural resource qualifies as renewable if it is replenished by natural processes with a growth rate comparable to or faster than its rate of consumption by humans. Information on the raw material constituents is obtained from our raw material suppliers.

The RRM content of a final product is based on form of delivery – that is product as it is sold. Paint is sold on a volume basis and applied at a specified volume (spreading rate) on surfaces. For these reasons we calculate the amount of RRM in Resene products by volume taking into account the low levels of solvents, if they are present, but excluding any water. In the case of partly renewable materials, the percentage of the renewable part is used for calculation purposes. The actual calculation used is:

$$vol\% \ RRM = \frac{\sum_i (vol \ RRM_i)(vol\% \ RRM_i)}{(dry \ film \ volume + solvent \ volume)}$$

Water is generally considered a perpetual and renewable resource, primarily because it is renewed constantly by many natural processes. We do not include it in our calculations because the rate at which it is consumed can compete effectively with the rate it is renewed or recycled by nature.

The renewable raw material level in Resene Earthsense Ceiling Paint is at least 20% by volume in the final paint film. Including water, the renewable raw material level in Resene Earthsense Ceiling Paint is greater than 65% volume based on the in-can volume of product rather than the dry film.