NEW DEVELOPMENTS IN ORGANIC AND EFFECT PIGMENTS
FOR THE COATINGS INDUSTRY

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SUN CHEMICAL PERFORMANCE PIGMENTS

INTRODUCTION
The influence of “Low Cost” manufacturers mainly from China and India continues to grow in the coatings market, despite this increased competition Sun Chemical has maintained a steady growth in market share.
This has been achieved a combination of business strategies, cost reductions from a global manufacturing strategy, improved customer relationships, improvements in technical service and customer support and by continued product development innovations.
This paper describes some of the recent advances and developments from Sun Chemical’s Performance Pigments business unit.

STIR-IN PIGMENTS
Organic pigments are produced by the controlled reaction of aqueous solutions of selected raw materials, intermediates, additives, catalysts to produce a press-cake typically containing 40-50% pigment. The water is removed from the presscake by first squeezing out the excess in a filter press and then by drying either in ovens or by hot air using for example Spin-Flash dryers.
This drying process creates high levels of pigment agglomeration, which the paint manufacturer has to break down using various types of dispersion equipment depending on the pigment type concerned, a costly and time consuming operation.

The ultimate target for all pigment research and development chemists has been to produce organic pigments that can be readily dispersed without any loss of performance characteristics. I can announce to you today a new development from Sun Chemical that achieves that objective. Sun Chemical working in partnership with a major resin manufacturer has developed a novel patented method of producing a range of organic pigments that can be incorporated by simple slow speed stirring alone.
Test results show that full dispersion is achieved after only 30 minutes low shear stirring additional bead milling gives no additional strength increase or colour development.
This new product development has been commercialized under the Surpass Elite W® trade name.
These new stir-in pigments give smaller pigment particle size and narrower particle size distribution in comparison to traditional dispersion techniques resulting in coatings with notably higher colour strength, higher chroma levels and increased transparency as can be seen from the results below from a recent customer trial.

“Standard” Current quality PR122 Waterborne Refinish Mixing Enamel
1/1 White Tint

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<th>DL</th>
<th>Da</th>
<th>Db</th>
<th>DC</th>
<th>DH</th>
<th>DE</th>
<th>Strength</th>
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<tbody>
<tr>
<td>Surpass Elite W®</td>
<td>-1.1</td>
<td>3.3</td>
<td>0.4</td>
<td>3.0</td>
<td>1.5</td>
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<td>112%</td>
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Masstone Transparency
“Standard” 55%
Surpass Elite W® 87%
The typical composition of Surpass Elite W® is 75% pigment and 25% polyurethane oligomer.

Previous surfactant based stir-in products exhibit water sensitivity problems due to the high surfactant content which limits their usage, being based on an automotive quality PU resin. Surpass Elite W® has no such weakness and following extensive testing has been fully approved for use in waterborne automotive refinish basecoat by a major global automotive coatings manufacturer.

Surpass Elite W® was originally developed for the automotive coatings market but offers significant cost and performance benefits for a wide range of waterborne market sectors. To date Surpass Elite W® has been produced based on Perylene PR179, Magenta PR122 and Violet 19 beta. Additional pigments are under development to extend the range.

NEW NEUTRAL FLOP BLUE FOR WATERBORNE COATINGS
Metallic finishes continue to be highly popular for automotive coatings. One of the characteristics of metallic colour styling is “colour flop” or “colour travel”, the change in colour and/or brightness depending on the direction of incident light and the angle of observation. Colour flop is an important consideration in automotive finishes as different parts although coated with the same paint appear a different shade depending on the angle at which they are viewed. The flop effect is related to light scattering of the organic pigment and is highly influenced by particle size and particle size distribution.

Additional chlorination of alpha copper phthalocyanine pigments results in pigments that exhibit very low colour flop properties, this class of pigments are PB15.1, tetra-chlor blue pigments. Tetra chlor blue pigments are used mainly used in the automotive market to produce neutral flop shades not possible to obtain with traditional PB15 pigments.

Until now it has not been possible to achieve the same neutral flop effect in both solvent and waterborne coatings as previously available tetra-chlor blue pigments work much better in solvent systems than in water. This has been a major problem for a market in transition from solvent to waterborne technology but has been solved by a new development in tetra chlor blue pigments from Sun Chemical the world leader in neutral flop blue pigment technology.

248 4861, Palomar Blue 15:1 is a high performance pigment for waterborne automotive coatings that allows formulators to match solventborne and waterborne coatings in effect shades for the first time.

248 4861 is a green shade blue exhibiting neutral flop, high chroma and low rheology, it expands the scope and styling options now available for automotive high performance coatings applications.

NEW CRYSTAL FORM PB60 INDANTHRONE PIGMENT
PB60, Indanthrone blue is mainly used in automotive especially for metallic shades due to its high levels of transparency, PB60 is also found in Industrial coatings.

PB60 is notably redder in shade than alpha copper phthalocyanine pigments and is even more weatherfast especially in light tints.

Conventional PB60 pigments are alpha crystal form. Sun Chemical has developed a new delta crystal form of PB60, Indanthrone blue, 260 2825, which has all the characteristics of the alpha crystal but is notably redder in shade.

PB60 is a much higher cost pigment than alpha phthalocyanine pigments, this new delta crystal form pigment not only offers an expansion of colour styling options to the formulator but also,
provides significant cost savings as traditional PB60 can be matched by a 75/25 blend of delta PB60/PB15.2.

Very red shade blues produced by blending delta crystal PB60 with violet 19 are more chromatic and durable compared to violet 19 blends with conventional PB60. 260 2825 has been developed to have good rheology in both solventborne and waterborne systems, a well known problem with PB60, Indanthrone pigments.

NEW QUINACRIDONE GRADES

PR209, 228 6736.
PR209 is a vibrant yellow shade red quinacridone pigment used in automotive, industrial and decorative coatings both water and solventborne. PR209 show excellent lightfastness, weatherfastness and heat stability similar to the better known PR122 magenta quinacridone and is highly interesting to the coatings formulator because of it’s shade which makes it an outstanding tool for achieving bright mid to yellow shade red high performance coatings. Sun Chemical has developed and introduced a new PR209 pigment to the market, 228 6736.

PR202, 228 6873.
PR202, 2,9-dichloroquinacridone is bluer in shade compared to PR122, 2,9-dimethlquinacridone, PR202 is mainly used in automotive coatings due to it’s high degree of lightfastness and weatherfastness. Sun Chemical has developed and introduced 228 6873, a new highly transparent PR202 which shows much lower rheology than competitors products even at higher pigment loading. 228 6873 enables significantly higher pigment content millbases which improves production efficiency and reduces costs.

SYNTHETIC MICA PIGMENTS
The use of Pearlescent pigments has grown rapidly since their introduction, mica based pigments are now widely used in the coatings, plastics, inks, specialties and cosmetics markets. The pearlescent pigment market in 2005 was reported to have grown to an annual consumption of 24,000 metric tonnes with a market value of $230 million dollars. The vast majority of pearlescent pigments are oxide coated natural mica pigments. Pearlescent pigments are typically produced by depositing layers of oxide onto a mica base. The pearl effect is produced by the selective reflection, refraction and transmission of light from the alternating layers of the pigment. This effect is often referred to as the “interference” of incident light. The thickness of the layers of oxide coating determine the colour change properties of the pearlescent pigment with viewing angle. Sun Chemical has introduced a range of synthetic mica pigments to the market that show significant colouristic and mechanical property advantages compared to traditional natural mica based grades, performance benefits are also shown compared to most other synthetic high luster pigments. Natural mica typically contains over 2% iron giving a yellow/brown shade in comparison to synthetic mica which contains less than 0.1% iron and is therefore “water white”. The performance benefits of synthetic mica pigments are a cleaner, brighter product with higher sparkle effect, narrower particle size control giving less lot to loss variation and the ability to produce larger flake size grades due to the absence of contaminant fault lines that are found in natural mica platelets. Despite offering performance advantages over natural mica based pigments the cost of synthetic mica is higher than natural mica grades which limits end use application areas.
The main usage of Sun Chemical synthetic micas is in markets such as automotive finishes, coatings for mobile phones, synthetic marble finishes etc where the colouristic and physical property benefits of synthetic mica are best suited.

For use in automotive coatings pigments need a high degree of weather fastness, good chemical resistance, heat stability and high levels of humidity resistance, Sun Chemical synthetic mica pigments meet all these requirements and in addition are chrome free.

As previously mentioned Sun Chemical synthetic mica pigments have demonstrated benefits compared to other synthetic high luster pigment grades on the market.

Customer experience shows that formulators can use significantly less Sun synthetic mica to achieve the same colour effect giving significant cost savings.

With a hardness factor of 2 Mohs, Sun synthetic micas are less abrasive to automotive OEM circulation systems compared to competitors grades, in addition to less wear on pumps through reduced abrasiveness, an important benefit as a consequence of the removal of restrictions on the allowed concentration of mica in the paint formulation, is that it provides the opportunity to extend the gamut of styling possibilities.

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