

A cluster of various colored squares (red, yellow, green, blue, purple, orange) arranged in a dynamic, overlapping pattern on the left side of the page.

Innovation and Optimization Drive Pigment Producers

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With their paint customers suffering significantly decreased demand in most key downstream markets, pigment manufacturers face the challenge of helping formulators gain whatever competitive advantage they possibly can. Many pigment suppliers, in addition to optimizing their own processes, are investing in the development of new products that will help improve the performance, cost efficiency, and sustainability of their customers' coatings.

It is no secret that demand for coatings has declined considerably over the past 18 months. Sales to the architectural sector in 2008 were down 10% compared to 2007, while the industrial segment suffered an even greater drop of 19%, according to The ChemQuest Group. Both segments are expected to decline even further in 2009—nearly 12% and 13%, respectively. (Special purpose coatings are the only category to retain positive growth.) Pigment demand, naturally, has responded in a similar downward fashion.

However, prices for some pigments, particularly inorganic and mineral-based products, rose in 2008. For example, chromium-based pigment prices climbed over 25%. So far in 2009 these hikes have not been eroded, but this situation is expected to change in the coming months.

To maintain a competitive edge in such a challenging environment, pigment manufacturers have sought ways to increase efficiency, reduce costs, and provide unique product features that will differentiate their customers' formulations. "In times of recession, innovation is key to remaining competitive and remaining a strong player in the industry," says Thierry Chevrier, director of BASF's North American Performance Chemicals—Coatings and Plastic Chemicals business. "We are encouraging our custom-

ers to use this time to evaluate new technologies that offer value—both in terms of potential cost reductions and new benefits that will allow them to differentiate their brands in the marketplace.”

In today's economy, customers are looking for ways to cut costs, color options to differentiate their products, and expanded choices in effect pigments, according to Russell Schwartz, vice president of Colors Technology for Sun Chemical Performance Pigments. “We are continuing to provide a solutions-tailored approach by designing pigments that will specifically benefit the new products manufactured by our customers,” he notes.

At Wayne Pigment Corporation, R&D efforts have increased during the recession as capacity has become available. These efforts, according to technical director John Sinko, help to build stronger customer relationships. Some goals of the company include improvement of processability of commercialized pigments and development of new products to meet demands for enhanced performance while reducing cost and improving environmental and safety characteristics.

Grace Davison worked hard in 2008 to better understand its customers' needs by making numerous plant visits. “This initiative has given us knowledge about new market trends and application requirements much earlier, making it possible for us to more quickly respond to customer needs,” states Michael Rosenberg, director of sales and marketing for the company's Materials & Packaging Technologies business. “With the economic challenges facing us today, the ability to provide rapid turn-around in product development is more important than ever.”

Ciba, which is now part of the BASF Group, is emphasizing its ability to provide many different types of additives in combination with its pigments. “We have a good understanding of the synergistic effects these raw materials provide in a formula. Whether a customer is looking to reduce costs with a more efficient dispersant that optimizes pigment use, or wants to differentiate its brands with a high-end effect pigment, we are able to offer them a range of options,” explains Bernadette Corujo, North America coatings marketing manager at Ciba. “Our solutions afford cost savings and efficiencies that can be realized during the manufacture, application, or life of the coatings.”

The idea of more “universal” pigments, or high-performance products that can be dispersible in water and other solvents as well as have application in a number of different end uses, has become attractive to pigment manufacturers as a way to help paint companies reduce overall costs.

Multifunctionality within the pigments themselves has also received significant attention from a number of

pigment producers. “Surface treatments to give pigments additional functional properties beyond the ability to add color are becoming more popular,” observes Susan Anderson, a director with The ChemQuest Group. “With these treatments, improved dispersion, better color development, heat reflection, and flame retardancy are some of the features manufacturers are targeting.”

Clariant has developed pigments for use in coatings applied to wood and concrete that allow formulators to replace dyes, solid dispersions, and solvent-based dispersions with one product. The Hostafine ultrafine dispersed pigments provide the brilliance, strength, and transparency of dyes along with the fastness properties of pigments, according to Falko Orlowski, coatings business manager for North America at Clariant.

Irgazin Solid Red from Ciba provides improved hiding power while maintaining color strength and durability for opaque yellow-red-violet formulations. “Formulators typically overcome hiding power issues in this color space by increasing film thickness, increasing the level of pigmentation or using a colored primer—all of which increase the cost to the customer. And since customers are moving to primer-free options, this is not a feasible option any longer. Now they have another option,” says Corujo.

The properties of special effect pigments, in particular, make them suited for increasing functionality. Ciba recently launched Xymara™ Fireball, a multipurpose effect pigment that combines the lightfastness of a typical quinacridone pigment with the luster of a mid-range metallic or pearlescent pigment. “The value of this product is that it allows the formulator to generate an exciting new effect in a streamlined formulation that often provides a more brilliant and clean hue than the traditional blend,” claims Corujo. The pigment is finding use in high-end finishes in the automotive and other markets.

New special effect pigments from JDSU offer novel visual effects created with diffractive technology, increased hiding power to reduce costs, narrow particle size distribution to optimize application performance, and infrared-reflective pigments to reduce heat load, according to custom color solutions manager John Book.

Heat reflectance, according to George Pilcher, vice president with The ChemQuest Group, will in fact be a growing application for multifunctional effect pigments as more and more municipalities pass regulations designed to reduce the heat island effect. While low sloped roofs will be required to be white, high sloped roofs will require special infrared-reflecting pigment technology. In both cases, infrared heat is reflected rather than absorbed by the building, thus reducing the energy load on air conditioning equipment.

Heucodur IR pigments from Heucotech are specifically designed to reflect in the near infrared. In addition, they have benefits beyond reducing energy consumption, according to COO Don McBride. "These functionalized pigments also enhance the shelf life of the coating. Due to the significant reduction in surface temperature, thermal degradation of the roofing components is minimized and the differences between day and night, direct sunlight, and shadowed areas will also be evened out. As a consequence, thermal warping becomes less pronounced."

Several pigments that help coating formulators create a unique look have also been introduced in recent months. "Consumers tend to spend more diligently in this economy, and unique looks and distinguishable appeal enhance the value of products," Chevrier points out. BASF's Sicopal Orange L 2430 allows manufacturers to achieve shades that were previously unattainable with inorganic pigments, while also offering high hiding power and heat resistance.



The number of new special effect pigments being brought to the market reflects the growing interest of paint and coating manufacturers to create unique looks not previously attainable. "This trend toward the use of pearlescent, metallic, and color-shift pigments that provide sparkle, glitter, and optical color change is particularly noticeable in North America," comments Pilcher. European coatings formulators have been using these pigments—even in architectural applications—for several years now.

Industrial coatings producers can formulate with two new effect pigments from Sun Chemical. The SunGem line of opaque, pearlescent pigments comes in 10 shades that provide high chroma color and also offer unique magnetic alignment properties that bring colorful three-dimensional effects. "These new colors will help industrial designers set new trends and position their products apart from their competition," asserts Schwartz. SunMetallics non-leafing aluminum cornflake and silver dollar pigments for solvent-based coatings provide high hiding power combined with color travel and metallic effects. Sun is launching seven new products in 2009 and will also be adding line extensions to meet the needs of formulators of waterborne and other specialty coatings.

Sun has also launched a full range of synthetic micas, including a pearlescent range of silver whites, interference colors, and metallic golds, bronzes, and russets. These products will be available in standard and weather-resistant forms.

Another new mica pigment on the market comes from BASF. Glacier Frost White, a "whiter white" effect pigment, was developed with a new generation of titanium dioxide-coated synthetic mica flakes. According to Chevrier, this pigment allows designers to achieve new levels of luster and brilliance in a broad range of coatings applications.

Providing such unique colors and effects has been just one area of focus for pigment manufacturers. Increasing the ease of use of their products, and thus increasing efficiency and lowering costs for their customers, has been another key target. One of the main processes receiving attention is pigment dispersion.

With the downturn in the economy and increasing availability of in-house capacity, many paint companies have been bringing previously outsourced dispersing operations back within their own operations as a cost-savings measure, according to Pilcher. While it is likely that dispersions will once again be outsourced when capacity utilization returns to previous levels, for the short term, pigment suppliers are looking to help paint manufacturers improve their dispersion processes.

Stir-in pigments like Sun Chemical's Surpass Elite W for water-based coatings eliminate the need for bead milling and thus avoid spoilage and rework problems, reducing processing time and time and resources spent on quality control, according to Schwartz. With Clariant's dispersible ED-Range of pigments for solventborne systems, customers can reduce their dispersion manufacturing time by over 50%, according to Orłowski. The company is now developing an equivalent range for waterborne formulations.

Many companies also offer prepared pigment dispersions. "These products enable customers to maintain just-in-time inventory levels as well as minimize the need for significant capital investments in areas that are not their primary business focus," explains McBride.

The Corrospense product line from Wayne Pigments now includes high-solids dispersions of strontium chromate and basic zinc chromate in selected solvents. No stirring or grinding is necessary, resulting in increased productivity, energy savings, and total elimination of dust exposure hazards as well as disposal of hazardous waste.

JDSU has developed passivated special effect pigments and dispersions designed for use in waterborne coatings. "With these products, the process require-

ments are significantly reduced, thus lowering the cost for our customers," Book notes. Clariant and Sun Chemical also offer pre-dispersed pigment products.



Many of these and other products also address consumer expectations for "greener" paints as well as increasingly stringent regulatory requirements placed on coating formulations. "Sustainability and the expectation for 'greener' products definitely has become an

important aspect of pigment R&D activities," Anderson remarks. "All aspects of pigment production and the products themselves are being addressed, including pigments designed for water-based paints or powder coatings, pigments made from 'green' ingredients, and reduction of dust hazards."

Wayne Pigments, for example, has developed versions of strontium chromate and basic zinc chromate inhibitor pigments characterized by "ultra low dustiness." The company's R&D efforts are also directed towards the development of zinc(II)-free corrosion-inhibitor pigments. Wayncor 205 is a heavy metal-free nontoxic product that is compatible with aqueous and solvent-based paint formulations and effective for steel and galvanized steel protection, according to Sinko.

Development of new matting agents and heavy metal-free anticorrosive pigments that help its customers introduce high-performance, environmentally friendly systems into the market is also a key strategy for Grace Davison. To ensure continuous supply of its products into the EU, the company has also completed full REACH registration for its silica gel, a major component of both its matting agents and anticorrosion pigments.

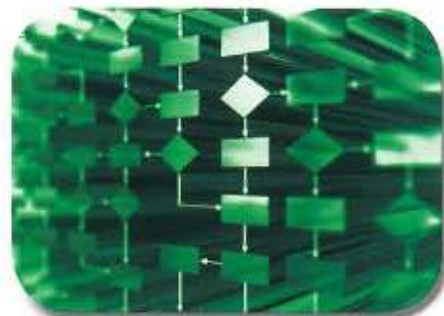
Both BASF and Heucotech have introduced new tinting systems. PureOptions Colorants from BASF is a sustainable point-of-sale tinting system designed to produce a wide range of paint colors with low odor and zero VOC. Heucotech's Heucorint for tinting paint at point-of-sale and Aquis Plus for tinting paint in-plant are zero VOC, APE-free and contain no formaldehyde. All of these systems meet the requirements for EPA Method 24.

To help speed up innovations and bring products to market sooner, some companies have developed special partnerships. "At Grace, we have increased collaboration with strategic partners and universities through our open innovation program to bring new

products to market in less time and with lower costs," says Rosenberg. The company's Incubator Technology Group, which focuses on emerging technologies and adjacent-space business opportunities, is also pursuing opportunities that will position the company to serve the future needs of customers.

An alternative approach by some companies has been to add new services. JDSU, for example, has formed a new Custom Color Solutions team that provides color trend research and consulting services to its customers. The group takes on part of the color design work, preparing formulations and initial styling suggestions. "We have staff color designers and applications engineers to provide realistic concept colors that are balanced and pre-screened ready for production," Book explains.

Optimization of operations, too, has been a fundamental strategy for many pigment manufacturers. JDSU has implemented Lean initiatives to reduce waste in all processes throughout the organization, including forecasting, sample processing, and equipment turn around time. Grace



has used Lean Six Sigma tools and training to achieve \$300 million in cost reductions, cost and capital avoidance, and revenue enhancements in 2008. "Such measures, while not easy to take, are positioning us to be able to support our customers in their struggles," states Rosenberg.

All of these various efforts require that pigment producers establish closer relationships with their customers. "Our customer relationships are a critical part of our mutual success," comments Corujo. "Moving forward we will continue to strive to strengthen and deepen these partnerships as we bring an even broader portfolio to them."

Strong relationships with customers and innovation are always important, and even more so now as the economic slowdown will not rebound overnight. "We can expect that times will remain tough for everyone in the coatings industry—formulators and pigment suppliers alike—for at least the next year," Anderson concludes. ■