Controlling Coating Color Quality with Dispersants

by Cynthia Challener
JCT CoatingsTech
Contributing Writer

Dispersants and pigment manufacturers discuss recent trends and issues affecting this sector.

CRITICAL COMPONENTS

Dispersants, although accounting for only a few percent of the total material in paint and coating formulations, play a critical role in their performance. Dispersants provide color stability and help maximize pigment opacity by increasing the exposed surface area of the pigment particles, thus increasing coverage while reducing costs. Because their products are a key component of paints, dispersant manufacturers work closely with coating and pigment producers to stay abreast of new technology developments. They also face the current challenges of higher raw material and energy costs and increasing regulations.

“The correct choice and application of a dispersant (or combination of dispersants) can dramatically affect the look and durability of paints and coatings,” notes George Pilcher, vice president of the consulting firm The ChemQuest Group, Inc. Craig McNair, technical director with Pflaumer Brothers, Inc., believes that, “the technology of dispersion is essential for an effective coating to meet the requirements of the end use customer.”

Dispersants today not only affect color development and stability over time and with respect to changes in shear, they also help maximize the visual, ultraviolet, and infrared opacity of pigments, protecting the binder in a coating from degradation and improving the energy efficiency of painted structures. “Effective use of dispersants can also lead to cost savings through reduction in the amount of pigment required to achieve a desired level of color and hiding power,” Pilcher adds.

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"The correct choice and application of a dispersant (or combination of dispersants) can dramatically affect the look and durability of paints and coatings," notes George Pitcher, vice president of the consulting firm The ChemQuest Group, Inc. Craig McNair, technical director with Pfaumer Brothers, Inc., believes that, "the technology of dispersion is essential for an effective coating to meet the requirements of the end use customer."

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Pigments in general are solid particles that are insoluble in the different solvents used in coatings formulations. Dispersants are necessary to ensure a uniform distribution of these particles throughout the paint. According to Hendrik Ahrens, R&D manager for coatings in the Functional Chemical Division of Clariant Produktion (Deutschland) GmbH, dispersing agents overcome compatibility constraints experiences with the three major coating components—pigments, resins, and solvents. "As a result, the design and synthesis of dispersing agents require a lot of experience in coating technology and chemical synthesis."

Specific benefits provided through the use of dispersants include high gloss, color strength, and uniform color appearance on every substrate, according to George Robertson, director of specialty dispersions technology for Sun Chemical. "Dispersants can reduce the incidence of flaws in the coatings when they are applied to surfaces," he states.

The manufacturing process can also be improved with the use of appropriate dispersants, which can reduce the dispersing time. In the dispersing process, the pigment is first wetted and then de-agglomerated into smaller primary particles through a shearing process. Dispersants are critical to initially speed the wetting process of pigment to resin, according to Andre Bendo, industry manager for Industrial Coatings with Ciba Corporation.

Stabilization of the dispersed particles with dispersants is also necessary or they will re-agglomerate. "The stabilization step is the most critical and difficult to accomplish. Done well, this step allows longer shelf life of the colorants, improved color, gloss, and color compatibility," notes Thomas J. Clark, marketing manager for Coatings, Polymer & Resins with Huntsman. Proper pigment particle separation and stabilization also results in a low pigment paste viscosity, which allows high pigment loadings, according to Robert T. Miller, product manager for Troy Performance Additives and Defoamers.

Stability of the final coating formulation is also affected by choice of dispersant. Ning Chen, North American business director for Rhodia Novecare, comments that, "Good dispersion can prevent flocculation or coagulation of pigments or fillers for wet paints and coatings in cans."

"The key," stresses Walter Conti, technical specialist for Perform-ance Chemicals with Buckman Laboratories, Inc., "is to use the proper dispersant for the specific application, although some dispersants can cross various formulation genres. It is important to select the proper amount/dosage in order to achieve a defect-free, overall smooth appearance, with excellent flow and leveling, and a gloss or sheen that meets the customer's specifications and is pleasing to the eye."

Nonionic dispersants have no charge and prevent the pigment from agglomerating via steric, or special, stabilization. They rely on hydrogen bonding, dipole-dipole interactions, or London Van der Waals forces to anchor to the pigment surface. The adsorption is strong because the dispersant is bound to numerous sites on the surface at saturation. Particle stabilization is provided sterically by the extended polymeric backbones of the dispersant.

In a waterborne system, for example, the hydrophobic (dislikes water) portions of the dispersant are adsorbed on the pigment's surface, while the hydrophilic (attracted to water) ends solubilize in the water phase through hydrogen bonding. In this way the particles are kept from clumping together again. Positively or negatively charged ionic dispersants rely on electrostatic repulsions to stabilize the pigment particles. Ionic dispersants act by coating the surfaces of particles.
with charges. The net charge on each particle’s surface causes the particles to repel one another, thus stabilizing the dispersion.

Polymeric-type dispersing agents, which can be made from numerous different polymeric materials, are much higher in cost per pound than traditional surfactant-like dispersants. They adsorb onto the dispersed pigments but provide little wetting and emulsifying properties. In some water-based formulations, this characteristic is attractive because it leads to lower levels of foaming than would be observed with surfactant-like dispersants.

Phosphate esters are often used in conjunction with the primary dispersants discussed above. These compounds are considered auxiliary dispersants and cannot be used by themselves. They provide assistance in stabilization largely through steric interactions with the pigment particles.

BEYOND THE CHEMISTRY: MEETING CUSTOMER NEEDS

While chemistry determines the way in which pigments disperse, pigments suppliers must use their understanding of that chemistry to develop the most effective products based on their customers’ formulation needs. Product development can be challenging in the highly regulated and constantly changing business climate of today.

To find out what the major issues are for dispersant producers serving the coatings market, ICI Com- munique interviewed several players in the industry. Both dispersant and pigment manufacturers shared their thoughts about new drivers, future expectations, and technology trends. Participants in this survey included the following:

- David Ross, Marketing Manager, Performance Solutions, Air Products
- Walt Conti, Technical Specialist, Performance Chemicals, Buckman Laboratories, Inc.
- Kevin Lasala, Director of Technology, BVK USA
- Andy Bento, Industry Manager, Industrial Coatings, Ciba Corporation
- Beth Lowe, Functional Chemicals Division, Coatings and Construction Chemicals R&D Technical Manager, Clariant Corporation
- Hendrik Ahrens, R&D Manager of Coatings, Functional Chemicals Division, Clariant Produkte (Deutschland) GmbH
- Thomas Clark, Marketing Manager for Coatings, Polymers & Resins, Huntsman
- Craig McNair, Technical Director, Pfanstiehl Brothers, Inc.
- Ning Chen, North American business director, Rhodia Newcares
- George Robertson, Director, Specialty Dispersions Technology, Röhm Chemicals
- Robert T. Miller, Product Manager, Troy Performance Additives and Defoamers
- Steven L. Will, Senior Technology Manager, Office of Technology Management, University of Illinois at Urbana-Champaign
- Dr. John Sinko, Technical Director, Wayne Pigments.

JC: What are the key issues driving the dispersant sector? Beth Lowe, Clariant: Currently, key drivers for the dispersant sector are regulatory issues and raw material costs. The constant sharp increase of raw material prices has caused us to investigate many avenues of reducing costs, including alternative, cheaper sources and optimizing processes in production.

Craig McNair, Pfanstiehl Brothers: The regulatory environment is indeed a major issue driving the dispersant sector. Coatings companies are being forced to market low-VOC coatings which are water-based or high solids solvent-based systems. Dispersants that work well in these systems are in high demand.

Kevin Lasala, BVK USA: Implementation of REACH will significantly increase the barriers for the industry to change these systems, limiting the performance space accessible with conventional polymerization technologies. Enhancements in performance will have to be achieved by more effectively controlling molecular architecture. Controlled polymeric technologies will enable molecular level control of dispersant structure, access to improved dispersant performance using conventional monomers.

John Sinko, Wayne Pigments: In the corrosion inhibitor pigment business, specific regulatory requirements for the elimination of any dust exposure hazard in paint manufacturing is the primary driving force behind the polymeric dispersant. Recent advancements of high solids pigment dispersion technology. Currently, promulgated OSHA regulations on PEL values for Cr(VI) have prompted R&D. The continued reliance on submicron pigment slurries, preparations, and coatings, and reduction of the toxic profile. Thomas Clark, Huntsman: Dispersants allow formulators to increase pigment concentrations as well as decrease grind time. Higher pigment loading allows finished coating formulators to tailor their needs for either stronger color strength or longer lasting concentrations. In other words, the higher loading would result in superior master-batch of color. The decrease in grind time adds to energy savings and more efficient production of the colorants by a reduction in pass or grind times by as much as 30%.

Robert Miller, Troy Coatings: The proper selection of dispersant and optimization of the use level will result in faster process times and allow higher pigment loading. This relates to savings in labor and energy and allows for larger finished batch size, all of which are cost savings for the coating manufacturer.

JC: Given that cost is such an issue, can we formulate in dispersant technology for coatings from a chemistry perspective? David Moss, Air Products: Improvements in polymer technology and surface science understanding have reached a level where the fine-tunings of dispersant performance attributes is relatively simple. Such modification has become key to meeting the dynamic market needs resulting from the diversification of pigment supply and the demands of environmental and “green” considerations.

Craig McNair, Pfanstiehl Brothers: Dispersant technology follows the evolution of coatings technology. Polymeric dispersants that combine wetting and stabilization technology have been developed for aqueous-based, solvent-based, high-solids, two-component, U.V.-cured, and powder coatings systems. New dispersant technology has also been developed for pigment and powder treatment and encapsulation. These surface-active products enable the pigment or powder to be used more easily in the ultimate application or system.

Ning Chen, Rhodia Newcares: Technology that allows for highly efficient dispersant of pigments and fillers without negative impact of the physical and mechanical properties of coating films has been important for the industry. Nanoparticle dispersion is a new territory that is gaining industry attention.

Thomas Clark, Huntsman: Much progress has been made by the industry in developing APE (alkyl phenol ethoxy- late)-free and zero-VOC products. This new materials enable coatings formulators to meet new environmental regulation being implemented around the world.

Andre Bento, Ciba Corporation: Dispersant technologies have advanced with respect to pigment surface interactions. To improve the surface interaction, acrylic block copolymer dispersants have been created using Controlled Free Radical Polymerization (CFRP) technology. The process yields a tailored dispersant with anchor groups at defined locations that improve particle stabilization and surface coverage.

Kevin Lasala, BVK USA: Application of emerging capabilities like Controlled Polymerization Technology (CPT) to dispersant manufacture has provided access to tailored polymers structures with enhanced performance. In contrast to conventional polymerizations in which monomer units are randomly distributed in the polymer chain, CPT enables a high degree of control over polymer structure and molecular weight. This can lead to enhancements in the efficiency of dispersant utilization and improvements in pigment loading, dispersion stability, rheological properties, color development, gloss, and transparency (Figure 1).

Steven L. Will, University of Illinois at Urbana-Champaign: Figure 1—Comparison of standard and controlled polymerization technology (CPT). (Source: BVK-Deriv)
with charges. The net change on each particle’s surface causes the particles to repel one another, thus stabilizing the dispersions.

Polymeric-type dispersing agents which can be made from numerous different polymeric materials are much higher in cost and require much more process control than surfactant-like dispersants. They adsorb onto the dispersed pigments but provide little wetting and emulsifying properties. In some water-based formulations, this characteristic is attractive because it leads to lower levels of foaming than would be obtained with surfactant-like dispersants.

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BEYOND THE CHEMISTRY: MEETING CUSTOMER NEEDS

While chemistry determines the way in which the products provide pigment particle stabilization, pigment suppliers must use their understanding of that chemistry to develop the most effective products based on their customers’ formulation needs. Product development can be challenging in the highly regulated and constantly changing business climate of today.

To find out what the major issues are for dispersant producers serving the coatings market, IC Cosmetics interviewed several players in the industry. Both dispersant and pigment manufacturers shared their thoughts about new uses, future expectations, and technology trends.

Participants in this survey included the following:

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- Kevin Lasula, director of technology, BVK USA
- Andre Bendo, industry manager, Industrial Coatings, Ciba Corporation
- Beth Lowe, functional chemicals division, Coatings and Construction Chemicals R&D technical manager, Clariant Corporation
- Hendrik Ahrens, R&D manager of coatings, Functional Chemical Division, Ciba Specialty Products (Deutschland) GmbH
- Thomas Clark, marketing manager for coatings, Polymers & Resins, Huntsman
- Craig McNair, technical director, Pfleumer Brothers, Inc.
- Bing Chen, North American business director, Rhodia Newcote
- George Robertson, director, Specialty Dispersions Technology, Xerox Chemicals
- Robert T. Miller, product manager, Tropy Performance Additives and Defoamers
- Steven W. Wile, senior technology manager, Office of Technology Management, University of Illinois at Urbana-Champaign
- Dr. John Sinko, technical director, Wayne Pigments.
Researchers at the university have developed an economic process for the production of Janus Particles. The surfaces of Janus Particles have two distinct areas, each of which has different surface properties. The two surfaces can be made from a wide range of different materials that are of interest to dispersant producers, including surfactants, pigments, proteins, and polymers.

Unlike ordinary dispersants, Janus Particles can have two different chemical features that can change incompatibly. As a result, the formulator has more freedom in developing what characteristics particles to utilize. By choosing the right particle treatment and 'Janus Balance' (ratio of the two treated areas on each particle), the use of Janus Particles can provide improved stability, color development, and viscosity control in coatings formulations.

Henrik Ahrens, Clarant Produkte: New technology from Clarant allows us to improve for improved dispersant for water-based coatings. Various dendrimeric polymers with star- and dendrimeric structures have been produced using anionic and radical polymerization techniques. These dispersant agents are strong additives for the solid pigment in the coating system.

The comb-shaped polymeric dispersant agents are suitable for inorganic and organic pigments. Nondendritic, aliphatic groups provide affinity to organic pigments like phthalocyanine pigments (blue, green), azo pigments (red, yellow), and polycyclic pigments (purple, pink, red, and yellow). The star-shaped dispersing agents have an increased adsorption onto organic pigments. They absorb onto the pigment surface at a higher packing rate and overcome flocculation and sedimentation. These dispersant agents are said to be effective for inorganic pigments, such as calcium carbonate, feldspar, and talc.

For inorganic pigments, comb-shaped, anionically charged polycarboxylate ether dispersants have been developed. They provide both steric and electrostatic stabilization in the aqueous phase, enabling the production of higher pigment concentrations. Polycarboxylate ethers are compatible for white pigments and extenders in emulsion paints or pigment slurries, colored inorganic pigments, such as for tinting systems, and even for highly concentrated nano-scale pigment slurries.
Researchers at the university have developed an economic process for the production of Janus Particles. The surfaces of Janus Particles have two distinct areas, each of which has different surface properties. The two surfaces can be made from a wide range of different materials that are of interest to dispersant producers, including surfactants, pigments, proteins, and other polymers. The particle cores can be made from most any material.

Unlike ordinary dispersants, Janus Particles can have two different chemistries (surfaces) that can be inherently incompatible. As a result, the formulator has more flexibility with what chemistries to utilize. By choosing the right particle treatments and "Janus Balance" (ratio of the two treated areas on each particle), the use of Janus particles can provide improved stability, color development, and viscosity control in coatings formulations.

Hendrik Abena, Clarient Produkte: New technology from Clarient attempts to address the need for improved dispersants for water-based coatings. Various dendritic polymers with star- and branch-shaped structures have been produced using anionic and radical polymerization techniques. These new dispersing agents have a stronger affinity for the solid pigment in the coating system.

The comb-shaped polymeric dispersing agents are suitable for inorganic and organic pigments. Nonionic and anionic groups provide affinity to organic pigments like phthalocyanine pigments (blue, green), azo pigments (red, yellow), and polycyclic pigments (purple, pink, red, and yellow).

The star-shaped dispersing agents have an increased adhesion onto organic pigments. They absorb onto the pigment surface at a higher packing rate and overcome flocculation and sedimentation. These dispersing agents are also suitable for carbon blacks (Figure 2).

For inorganic pigments, comb-shaped, anionically charged polycarboxylate ether dispersants have been developed. They provide both steric and electrostatic stabilization in the aqueous phase, enhancing the production of higher pigment concentrations. Polycarboxylate ethers are suitable for white pigments and extenders in esterification paints or pigment slurries, colored inorganic pigments, such as for tinting systems, and even for highly concentrated nano-scale pigment dispersions.

Comb-shaped dispersant (polycarboxylate ethers) for inorganic pigments are shown in Figure 3.

Figure 2—New dispersants for organic pigment. (Source: Clarient Produkte)

Figure 3—Comb-shaped dispersants for inorganic pigments. (Source: Clarient Produkte)

Market Update

Crag McNair, Papehra Brothers: "Coatings are leveling off and market development being driven by the need for greener products. New heat-reflective pigments for these "cool" coatings are now being developed within our research group. The latest technology looks to combine multi-functional dispersants with respect to better color acceptance and development, surface tension reduction, desirable foaming, and wetting properties with the ability to effectively disperse heat-reflective pigments."

George Robertson, Sun Chemical: Dispersants reduce the need for solvents in the formulation of coatings. By using less solvent in the milling process, you reduce emulsions and save energy, which takes half the time to mill and still achieve the same saturated colors.

Have changes in pigment technologies occurred in new dispersant chemistries? If so, what kinds?

David Moss, Air Products: The pigment loadings from western suppliers has required the development of unique dispersants for optimal performance.

Crag McNair, Papehra Brothers: I would favor the word "technologies" rather than "chemistries." We find more pigments are being produced in Asia that are not surface treated as well as pigments that were produced in the U.S. or Europe. The coating technology used for these pigments has caused a higher demand for wetting agents and dispersants for these pigments to be used in the same end use applications. We have developed new polymeric dispersants designed and tested for these pigments.

Ning Chen, Bhoda Newcare: We see a move to "greener" coating technologies such as APE-free, zero-VOC products. A vast majority of customers have looked at products for development that meet this requirement. In addition, there have been a number of advancements in polymer chemistry to use non-acrylic monomer base, i.e., use of more bio-friendly monomer base. Most of them are still in the development stage.

Thomas Clark, Huntsman: Lignin has been used as a dispersant in the past so there is precedent for bio-derived dispersants. Coatings companies are looking to increase their use of bio-based raw materials and go to low- or zero-VOC formulations. Dispersants that have bio-content will be attractive as companies look to increase their use of bio-derived materials.

Beth Loux, Clarient Corporation: VOC regulations are impacting the industry. The industry is always pushing for lower VOC raw materials. In the short term, we are evaluating all of our dispersing agents in paint formulations to determine their effect on VOCs. In the long term, we will have to come up with new chemistries that will be considered to contain low or no VOCs.

Walter Conti, Buckman Laboratories: With the market moving to green chemistry and higher performance, all raw materials in coating formulators are under scrutiny for quality, durability, and performance. Thus, the paint manufacturers will have to decide what dispersant will do what they require in their coating and at a cost that justifies their use. Dispersants, although only used in small quantities in coatings, are of important impact on overall coating appearance and performance. While the substitution in the ingredients may seem trivial, it can make a major change in the finished product. Only use of quality, dependable dispersants with well characterized performance characteristics will provide the desired effect.

Robert Miller, Troy Corporation: Dispersants that have low toxicity and odor are also desired by many customers.

Crag McNair, Papehra Brothers: "Coating products are leveling off and the market development is driven by the need for greener products. New heat-reflective pigments for these "cool" coatings are now being developed within our research group. The latest technology looks to combine multi-functional dispersants with respect to better color acceptance and development, surface tension reduction, desirable foaming, and wetting properties with the ability to effectively disperse heat-reflective pigments."

Thomas Clark, Huntsman: Changes in pigment technology include the finer particle sizes needed for ink jet technology and bringing lower ink viscosities, resulting in better transparency and color strength. To obtain the finer particle sizes for pigments, including nanometer sizes, there is a need for dispersant technology that is better than the simple surface active agents used before. These include multifunctional dispersants, such as the block and comb polymer surfacants available today. The move is now on to dendritic surfactants, which will help to achieve even smaller particle sizes.

Ning Chen, Bhoda Newcare: There is an overwhelming number of dispersants and synergists on the market, making it very confusing for paint formulators. We also believe there is a real need for a "universal" dispersant technology that can be used for all colors in a selected system.

Compatibility will also be an issue for different types of resins and pigments used in in-house mixing systems for the professional segment and color mix systems for the deco market, which will require higher loadings, viscosity control, and stability.

Robert Miller, Troy Corporation: For the foreseeable future and beyond, there will be a continued effort to provide dispersant products that provide improved pigment dispersion, have improved environmental impact, and give improved cost performance for the coating manufacturers.

Ning Chen, Bhoda Newcare: Dispersant technology is heading towards more effective and efficient dispersing agents for a greater versatility of pigments, higher compatibility with different solvent and resin systems in combination with better environmental friendliness, and lower toxicity for humans.

Such a feature for universal colorants and pigment slurries for easy applications, low- and zero-VOC products addressing ecological concerns, and high efficiency products to reduce application times and cost.
DISPERSANTS — Supplier Roundup

Air Products offers a wide range of wetting agents and dispersants designed to provide technical solutions for environmentally friendly coating systems. "We focus on customer needs such as ease of use and improvement of performance characteristics such as gloss, color development, or stability," notes Murray Moss, the acquisition of Tomah Products in 2006 broadened the company’s portfolio to include alcohol ethoxylates and ethylene oxide type waxes, making it an even more attractive yearling technology useful for dispersing pigments.

Buckman Laboratories offers a line of sodium alcohols and alkylates for water-based systems. Busepne 39 exhibits excellent color development, low foaming, reduced rootling, and enhanced tint strength. Busepne 229 is a unique water-based dispersant designed for use with inorganic and carbon black and works well in water-dispersable alkyls. Busepne 47, a zero-VOC product for solvent-based coatings, works well with inorganic colors and carbon blacks, and works at very low levels of typically 0.2% based on total formula weight.

BYK-Chemie provides a broad range of wetting and dispersing additives marketed under the DES-PERVY, BYK, BYKCHIME, and LAC-TIMONtrade names. The company’s ability to access a large number of chemical platforms enables it to utilize the technology which provides the best solution for the customer, according to Lasalle. Since 2006, BYK has introduced several new wetting and dispersing additives based on Controlled Polymerization Technology. These products include DISPERBYK 8000, specifically developed for the dispersion of silica-based matting agents in solvent-free UV systems; DISPERBYK 8020, designed for the formulation of a range of free-sable pigment concentrates for aeronautic coatings; and DISPERBYK 2025 and 2027 for solventborne industrial, wood, architectural, and coil coatings.

Ciba’s dispersant range covers three product classes. The EFRA® 4000 series of high molecular weight polyurethane and polyacrylate dispersants provides strong viscosity reduction and wide system compatibility for both organic and inorganic pigments, making it possible to increase loadings and reduce VOCs. EFRA® 4000, EFRA® 4350, and EFRA® 4340 for solventborne applications, and EFRA® 4558 for waterborne coating systems are the newest products in this line and are produced using Contolled Free Radical Polymerization technology, which, according to Bendo, yields an optimal surface interaction between dispersant and pigment. Additional products will be launched in 2008.

The EFRA® 5000 series of conventional wetting and dispersing agents from Ciba are intended to disperse both inorganic and organic particles. The DISPEX® anionic dispersants are based on acrylic chemistry and specifically designed for dispersion of inorganic mineral particles.

Dispersion product development in Clariant’s Coatings and Construction Chemicals Division for aqueous on the coating demands for APE-free and low or no-VOC chemistries. The company is currently evaluating the application performance of new APE-free products to further support the industry. Clariant has also installed larger reactors in its multipurpose plant in North Carolina and is in the process of expanding its ethoxylizer capabilities at another U.S. production site and in Germany. In its Dispersion range, Clariant’s Prodolx offers polymeric dispersing agents as well as products based on surfactant technology. The latest developments are Disperalype PCE, a polycarboxylate ether suitable for the dispersion of inorganic pigments, and Disperalype ASO, a star-shaped polymeric dispersing agent for organic pigments. Disperalype PSL-103 is a comb-shaped polymeric dispersing agent for organic pigments. Patents are pending for these three dispersants.

In addition, the company has opened new R&D laboratories in Shanghai and Mumbai, adding to similar facilities in Germany, Brazil, and the U.S.

Huntsman’s EFFESPERS® non-ionic, comb-shaped polymeric dispersants are sold in water-based, solvent-based, and UV-curable systems that stabilize classic organic pigments, high-performance pigments, and varnish carbon black grades. According to Clark, these universal dispersant and wetting agents provide higher pigment loading (stronger color) and superior stability (increased gloss) compared to more traditional products. The company commissioned a new manufacturing plant in Innsbruck in 2007 that produces polyethers that are used in the manufacture of its EFFESPERS® dispersants.

Plaumer Brothers offers a full line of wetting and polymeric dispersants for both water- and solvent-based systems. The new additive, S55, is a very low foaming, APE-free polymeric dispersant for water-based systems that can be used to disperse both inorganic and pigment pigments without the need for added propylene glycol. Tallic B-8 is a nitrogen-containing dispersant for solvent-based or solvent-free systems that is effective in dispersing a broad range of inorganic pigments. It significantly reduces wetting time, allows for higher pigment loadings, and is effective in improving color with over time, according to McNair.

For heat-refractive pigments, Plaumer has developed a new blue-shade amorphous black dispersion for a coating that copes close to the heat reflectance of a white substrate and reduces the heat build-up of the control black coating by 77% (Figure 4)""
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Buckman Laboratories offers a line of sodium alkyl sulfate surfactants for water-based systems. Bupersene 39 exhibits excellent color development, low foaming, reduced rusting, and enhanced tin strength. Bupersene 229 is a unique water-based dispersant designed for use with inorganic colors and carbon blacks and works well in water dispersible alkyls. Bupersene 47, a zero-VOC product for solvent-based coatings, works well with inorganic colors and carbon blacks and works at very low levels of typically 0.2% based on total formula weight.

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Huntsman’s EFFISPHERE non-ionic, comb-shaped polymeric dispersants are sold in water-based, solvent-based, and UV curable systems that stabilize classic organic pigments, high-performance pigments, and various carbon black grades. According to Clark, these universal dispersant and wetting agents provide higher pigment loading (stronger color and superior stability and gloss) compared to more traditional products. The company commissioned a new manufacturing plant in South Korea in 2007 that produces polyethoxymethanes that are used in the manufacture of its EFFISPHERE dispersants.

Plauner Brothers offers a full line of wetting and polymeric dispersants for both water- and solvent-based systems. The P-2255 is a new, very low foaming, APE-free polymeric dispersant for water-based systems that can be used to disperse both inorganic and organic pigments without the need for added propylene glycol. Talcfin K-8 is a water-based, inorganic dispersant for solvent-based or solvent-free systems that is effective in dispersing a broad range of inorganic pigments. It significantly reduces washing time, allows for higher pigment loadings, and is effective in processing color with over time, according to McNair.

For heat-reflective pigments, Plauner has developed a new blue-shade metallic black dispersion for a coating that copes close to the heat reflectance of a white substrate and reduces the heat build-up of the control black coating by 77°F (Figure 4). "This reduction of heat build up is tremendously significant," McNair says, "and the results are due to the choice of pigment and to the dispersion stabilization achieved by the new dispersant technology."

To support its development efforts, the company opened a new technology center near Princeton, N.J. in 2007. The technology center has two main focuses: synthesis of new polymeric dispersants and a complete dispersion laboratory. The dispersion laboratory includes a colorant pilot plant for commercial evaluations.

Rhodia offers a broad range of polymeric (acrylic and polyester copolymers) and nonionic primary surfactants under the Roholide® and Rohopol® brands. Roholide and Rohopol are based on ethylene oxide, propylene oxide, and alkylamines, respectively. The company also provides Rhodaphine® phosphate ester auxiliary dispersants. Recently, Woodland set up a paint application laboratory at its Center for Research and Technology in Bristol, PA. Efforts there revolve around the development of new dispersants designed to address the technical needs of customers, according to Chen. The company has a second paint application lab in Singapore and it is currently adding inks to research labs in Auberchies (near Paris), Fester, Shanghai, Chinon, and Pennsylvania.

Sun Chemical offers many dispersant product lines for the printing industry. Its Suntex® range is specifically formulated for lithographic inks and enables higher pigment content (more environmentally friendly), ease of use, and improved formulation options, according to Robertson. The company’s SpectraFlex® product line is formulated for applications such as inks for gravure printing, flexo, sheet fed, and offset print- ing inks. A new no-VOC, general purpose dispersant for non-aqueous systems will be introduced by Troy Corporation under its Tropylene Z line. This product expands the company’s portfolio of dispersant offerings for aqueous and solventborne systems.

Wayne Pigment Corp. recently introduced its Corrosperse® product line, which includes a dozen high-solids, resin-free dispersants of stonichrome technology in several different organic solvents as well as water-based systems in some selected solvents. The dust-free Corrosperse products are convenient for use in processors with all contemporary manufacturing technologies for high performance coil and aircraft printers. Distribution of the products in recyclable containers also eliminates the issues associated with disposal of CTCI containerized packaging materials, retaining considerable savings. "Our investment in this technology is intended to extend the commercial life of stonichrome chromate and basic zinc, chrome derivatives, two highly valuable corrosion inhibitor pigments," notes Vukos. M.