# Market Update: RESINS

Photo courtesy of Rohm and Haas Co.

by Cynthia Challener,
*JCT CoatingsTech*
Contributing Writer

Higher raw material and energy costs, increasing environmental regulations, and a demand for improved performance from customers are challenges facing suppliers of resins for the coatings market. The industry will also continue to experience consolidation and globalization. Overall growth will remain at a very moderate rate for several years to come. Resins for solvent-free coatings (waterborne, powder, UV) and higher performing resins such as polyurethanes offer the greatest potential for the future.

According to Steven Nerlfi of Kusumgar, Nerlfi & Growney, a market research firm, 4.66 billion pounds of vehicle (resin plus crosslinker) valued at $4.5 billion were sold into the U.S. coatings market in 2002. He estimates the volume of vehicle sales will climb to nearly 5 billion pounds and be valued at almost $4.9 billion in 2006, which corresponds to a growth rate of 2% per year. Mr. Nerlfi notes that the biggest resin types are acrylics and urethanes.

Michael D. Brown of The ChemQuest Group, Inc., a management consulting firm located in Cincinnati, OH, forecasts sales of resins for the U.S. coatings market to grow at an average of 3.1% per year to 4.1 billion pounds in 2006. The demand for acrylics and vinyls in architectural coatings remains and this group of resins will continue to experience above average growth and maintain its leading sales position. The use of epoxy resins for industrial maintenance and e-coat applications will also continue to grow, while alkyds will see a further decline in sales with the ongoing shift away from solventborne coatings.

As the shift to waterborne coatings continues in response to increasing environmental regulations, the ChemQuest Group sees an increased struggle for manufacturers to develop resins that meet the performance levels required for heavy industrial maintenance. The long-term trend is to reduce volatile organic compounds (VOCs) to 50 gms/liter. At the same time, there is a trend toward the use of higher performance resins such as polyurethanes, notes Mr. Brown.

All of the major players agree that regulatory compliance requirements are a key driver of the resins market today. Henry Bunch, business director, Engineered Polymer Solutions/Color Corporation of America (EPS/CCA) says Ozone Transport Commission (OTC) regulations coming in 2005 in the northeastern U.S. and the need for maintaining product performance at the lower VOC levels are of most importance. He also notes that drivers in the Industrial markets are the hazardous air pollutant (HAPs) regulations and maximum incremental reactivity (MIR) compliance for aerosols, again, without sacrificing performance.

Waterborne technologies continue to increase in popularity as the EPA pushes through tighter VOC regulations and resin manufacturers respond with higher performance products, adds Wolfgang Regele, Vice President of product management for Reichhold. "Step-change technology is a big focus, at least for Reichhold. We are offering new waterborne alkyds as a technology bridge for those formulators and end-users reluctant to abandon conventional technologies," he notes.

"Vinyl acetate/ethylene (VAE) emulsions will be a key technology to introduce the emissions-free concept to the entire European paint industry," says Diana Peninger, director strategic marketing for Celanese Emulsions. In these emulsions, water replaces the function of plasticizers (hydroplastification), but the emulsions maintain the same degree of processability and quality, such as wear resistance, as emulsions based on solvents and plasticizers.

"We see the new environmental regulations that address VOCs as outstanding opportunities for Surface Specialties to address the needs of our customers in the automotive, architectural and industrial segments," says Terry Scoville, market manager for liquid coating resins— Americas, of Surface Specialties UCB. Reduced cost, solvent-free and reduced-VOC, and improved durability properties for construction and transportation coatings also provide large growth opportunities for innovative technologies, according to Chuck Reardon, Dow polyurethanes global business development manager, Rigids and CASE (coatings, adhesives, sealants, and elastomers).

In the polyurethanes market segment, customer demand, created by unmet consumer needs, is the factor initiating new technologies, says Mr. Reardon. "Customers gravitate toward the technology leaders in the coatings marketplace and tend to stick with those that can provide improved product performance at lower costs through innovative chemistries."

For powder coatings, resin manufacturers are continuing to focus on technologies for thinner films and low-temperature cure applications to reduce applied costs and offer powder coating technology to popular heat-sensitive substrates such as medium-density fiberboard (MDF), notes Mr. Regele.

UV cure coatings are also gaining interest. "The trend towards UV/EB-cure coatings continues to gain momentum as more and more formulators recognize the incredible performance—not to mention environmental—benefits of the technology," says Dr. Gary Ceska, vice president of technology for Sartomer Company. "In fact, a recent study reported that industrial coatings alone account for 47% of all UV/EB-cure applications. "We expect that number to keep climbing over the next 10 years and beyond, particularly as VOC regulations become increasingly stringent," he adds. Composites formulators are also finding that UV-cure coatings can

## U.S. Coatings Market

| Class/Resin | 2002 Lbs Resin | 2007 Lbs Resin (est.) | % AGR (Dry Lbs) |
|---|---|---|---|
| Alkyd | 459.5 | 468.0 | 0.40% |
| All Acrylics | 1209.5 | 1434.5 | 3.50% |
| All Epoxies | 441.5 | 524.4 | 3.50% |
| All Polyesters | 308.9 | 374.0 | 3.90% |
| All Urethanes | 306.4 | 359.1 | 3.20% |
| All Vinyls | 529.1 | 650.0 | 4.20% |
| Ca Sulph | 1.6 | 3.1 | 14.50% |
| Cellulosic | 32.4 | 31.4 | -0.60% |
| Chlor Rubber | 4.3 | 3.3 | -5.00% |
| Floropolymer | 0.3 | 0.4 | 3.10% |
| Inorg Zn | 15.3 | 16.2 | 1.20% |
| Methyl Methacrylate | 1.0 | 1.1 | 1.80% |
| Nylon | 3.4 | 4.3 | 5.30% |
| Oleoresinous | 15.2 | 14.9 | -0.50% |
| Other | 56.9 | 69.5 | 4.10% |
| Oth-PVA | 8.2 | 8.7 | 1.30% |
| Phenolic | 7.5 | 6.9 | -1.70% |
| Polyamide | 2.7 | 3.3 | 4.20% |
| Polyamideimides | 2.7 | 3.2 | 3.50% |
| Polyesterimide | 4.3 | 5.2 | 3.30% |
| Polyethylene | 0.5 | 0.5 | 1.90% |
| Polyphenylsulfone | 0.0 | 0.1 | 7.00% |
| Polyvinyl Butyral | 0.2 | 0.2 | 3.80% |
| Polyvinyl formal | 1.0 | 1.2 | 2.70% |
| PVC | 59.2 | 62.1 | 1.00% |
| PVDC | 13.5 | 16.7 | 4.20% |
| Shellac | 7.9 | 7.4 | -1.30% |
| Styrene Acrylic | 15.8 | 19.0 | 3.80% |
| Grand Total | 3509.0 | 4089.0 | 3.10% |

*Source: ChemQuest Group*

enable compliance with VOC mandates, and Sartomer anticipates a period of significant growth in this application.

"Future innovations in the architectural coatings market will focus on offering performance improvements such as better washability, block resistance, gloss, exterior durability, and applications properties," says Graves Clayton, market manager for architectural coatings, UCAR Emulsion Systems, a business unit of The Dow Chemical Co.

Other general trends in the resins market include a move from vinyl acrylic to 100% acrylic resins for interior broad wall paints, a desire for lower odor interior paints, and an increased use of color for decorating, according to J.R. "Rusty" Johnson, marketing manager, architectural binders, with Rohm and Haas.

Resins producers must also contend with increasing raw material and energy prices. "With higher prices dominating the market, raw material manufacturers will reinvest," notes Mr. Bunch. "However, there is a lag before that capacity will affect the market and I would anticipate generally higher costs to persist through the majority of 2004," he adds.

"There is an intense competition, based not on technical expertise but on prices," notes Wilfied Roberts, vice president of precoated metal for Degussa. The result is the development of more economic and/or better technical solutions that provide benefits for the customer. The art is in differentiating between essentials and non-essentials, when in some cases only time will tell whether a function has been an essential one or not. "It is clear, however, that innovation is an essential attribute for companies serving the industrial coatings market," he adds. "Therefore investing in R&D is not only critical these days, but is imperative for creating new solutions for the customer, and therefore, is essential for future business."

The epoxy resin industry is under pressure due to a combination of previous price erosions and continued increases on raw materials, notes Juan Antonio Merino, commercial director, Europe and North America, epoxy products & intermediates at Dow. "As a consequence, the margins for Dow and many other epoxy resin producers are minimal and must be restored to reinvestment levels." Mark C. Walter, business manager, coatings resins—Americas, of Eastman Chemical Company adds that "With many companies' heightened focus on earnings, there is a strong drive to improve the cost performance ratio of their exiting offerings."

**Leading Suppliers of Resins for the Coatings Market**

- Air Products and Chemicals, Inc.
- Akzo Nobel
- Avecia
- BASF
- Bayer
- Celanese
- Crompton
- Degussa
- Dow/UCC
- DSM
- EPS/CCA
- Eastman
- Huntsman
- Noveon
- Reichhold
- Resolution Performance Products
- Rhodia
- Rohm and Haas Company
- Sartomer Company
- SC Johnson
- Surface Specialties UCB

*Source: ChemQuest Group*

"Energy prices, particularly natural gas, are impacting the cost of manufacture (and feedstock costs)," says Mr. Brown. "Due to structural problems, natural gas is not forecast to come down in price near term." In a presentation to the National Paints and Coatings Association, Bill Forrester of Bayer Corporation called the natural gas situation "an emergency for America." Margins are being significantly eroded. For example, "while polyurethane feedstock sales pricing has remained essentially constant for the last five years, energy's effects on costs have reduced the margin 42% on average during the same time period," says Mr. Forrester. In addition, the U.S. industry has become much less competitive because of high energy prices.

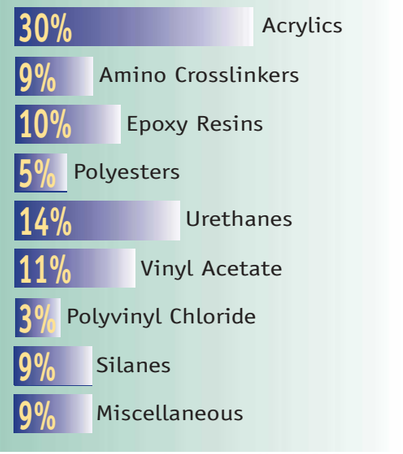
Globalization of both the resins and coatings markets has also impacted suppliers. "The market is such a global market, that customers are requiring suppliers to offer a wide range of options with a global manufacturing presence," says Marino Papazoglou, market manager, North America epoxy additives for Air Products and Chemicals, Inc. Crompton is also focusing on growing its urethanes business through globalization efforts that include the placement of experienced technical and market development personnel around the world, says Jeff Gault, worldwide market manager for Crompton's Witcobond polyurethane dispersions business.

Consolidation of resin producers has also been occurring. Some examples include Dow's purchase of the acrylic monomer business of Celanese, UCB's acquisition of Solutia's resins business, and the sale of Crompton's OSi unit to General Electric. "In response to overcapacity in the market, which has resulted in severe margin erosion, we're seeing some significant players selling off portions of their business in an effort to remain competitive," says Reichhold's Mr. Regele. "We recently combined our former composites and coatings divisions into one business built around key end-to-end processes to better align our resources and support all of our customers needs more effectively and efficiently," he adds.

With the acquisition of Celanese's acrylics business, Dow will position its current acrylics activities into a complete, integrated acrylic acid chain. According to Celanese, the sale allows the company to maintain a reliable source of supply for its emulsions business in Europe and fulfill its strategic commitment to a more focused portfolio.

In addition to its purchase of Solutia's resins, additives and adhesives, UCB also acquired the graphic arts business from Air Products in the first quarter of 2003 and merged its film and chemical sectors to create the new company, Surface Specialties, Inc. Surface Specialties gained technology for liquid coating resins (including waterborne and high-solids), technical resins, additives, and adhesives for high-end industrial coating applications with the Solutia purchase. The Air Products acquisition provides Surface Specialties with innovative liquid resins, including waterborne emulsion and solid acrylics for graphic arts applications.

**Breakdown of Major Resin Types for the U.S. Coatings Market**




*Source: Kusumgar, Nerlfi & Growney*

Crompton continues to actively focus on its worldwide polyurethane dispersions business. "Formulation additives from GE/OSi are still recommended by Crompton for optimum performance in numerous end-use applications," notes Andy Clock, worldwide business director for Crompton's Adiprene®/Vibrathane cast urethane prepolymers and Witcobond polyurethane dispersions businesses.

Both Akzo Nobel and Eastman Chemical have announced that they are planning to divest their resins businesses. Akzo is to sell its coatings resins business and two other businesses from its chemicals portfolio "to create value by moving towards a more consistent portfolio of businesses," according to Chairman of the Board of Management Hans Wijers. The company expects to close a deal some time in 2004.

Eastman has identified several product lines in its coatings, adhesives, specialty polymers, and inks segment (CASPI) that are performing below acceptable financial levels and has retained J.P. Morgan to assist in evaluating the strategic alternatives for these segments. Those under review include acrylate ester monomers, composites (saturated polyester resins), liquid and powder resins, inks and graphic arts raw materials, and textile chemicals. Possible actions include restructuring, divestiture and consolidation. CT

## RESINS — Supplier Round Up

• **Air Products and Chemicals, Inc.** is a global supplier of curing agents, modifiers, and specialty resins. The main uses for these products are in adhesives, civil engineering and construction, coatings, and composites.

Air Products recently introduced its new waterborne epoxy curing agent Anquamine 287, a one-step green concrete primer and curing compound. Anquamine 287 cures, primes, and coats green concrete in less than 48 hours instead of the typical 28 days, and does so without the time-consuming and costly step of shot-blasting the surface. Anquamine 701, launched in late 2002, is a unique waterborne curing agent used for moisture vapor transmission self-leveling coatings for concrete, and as a coating for new and existing concrete.

Air Products is completing plant expansion and debottlenecking activities at its facilities in Los Angeles, CA and Manchester, England. The company increased production capacity at Los Angeles and put in a new reactor at Manchester.

The company also acquired Sanwa Chemical Industry Co., Ltd., a leading Japanese producer of specialty polyamide resins and epoxy curing agents with operations near Tokyo, Japan, and in Singapore. "Sanwa will be of great assistance in gaining greater access to the important Japanese and Asian markets," says John E. McGlade, vice president and general manager, performance materials for Air Products.

• **Akzo Nobel Resins** is a global supplier of solventborne, waterborne, UV, and powder resins for coatings and printing ink applications and offers alkyds, polyesters, acrylics, and melamines. The company has placed the business on the market and expects to find a buyer sometime in 2004.

• The **NeoResins** business unit of Avecia offers waterborne technologies such as acrylic emulsions and polyurethane dispersions for application in water-based coatings and water-based printing inks.

In July 2003, NeoResins entered into an agreement with Indulor Chemie GmbH (Ankum, Germany) and Indulor AG (Zug, Switzerland) to distribute Indurez solid resins and Induprint solutions of these resins in the Americas and the Asia-Pacific region.

The company has also introduced several new resins in the Americas including NeoRez R-9627 and NeoCryl XK-110 floor coating resins; NeoCryl XK-98 decorative coating resin; NeoCryl A-662, NeoCryl A-6115 and NeoRez R-1000 automotive and plastic coating resins; and NeoCryl XK-100 and NeoCryl A-608 metal coating resins. Avecia has also introduced a broad range of new products in Europe and Asia.

Photo courtesy of Degussa Corporation

Polyester resin coil coating application (industrial facades).

• **BASF** offers epoxy, acrylic, polyester, vinyl and polyvinyl ethers, amino resins, polymeric isocyanates, acrylic emulsion, alkyd resins, UV curing resins, photoinitiators, and aliphatic amines for automotive, transportation, general industrial, coil coatings, general maintenance, house paint, wood coatings, UV coatings, anti-corrosion, and ambient and thermal crosslinking applications.

Recently, BASF completed the consolidation of its pigment and resins labs, previously located in different states, into a single, new facility in Wyandotte, MI. "The lab is designed to encourage the 'fusion' of BASF's resins and pigment know-how to bring customers 'system solutions' to their coatings problems," says Tom Hall, business manager, performance chemicals for coatings in North America.

BASF also invested in an amino resin production plant at its Wyandotte site that is scheduled to begin production in mid-2004.

• **Celanese** offers vinyl acetate monomer, emulsions, polyvinylalcohol, solvents, intermediates, and polymers to the coatings industry.

Recently, Celanese's Ticona business launched GUR Micro-Powders, ultra-high molecular weight polyethylene (PE-UHMW), for additives in paints, coatings, and polymers applied to substrates that will be exposed to significant wear, corrosive acids, lye or aggressive gases. Due to GUR's unique toughness, this micro-powder considerably improves abrasion and scratch resistance, as well as chemical and mechanical stability of products.

Celanese AG acquired its emulsions business from Clariant at the end of 2002 to strengthen and forward integrate the acetyl chain, the core business of Celanese. Major products offered include acetic acid, acetic acid derivatives, vinyl acetate monomer, polyvinylalcohol, and VOC-free Mowilith emulsions for interior applications.

"We are continuously optimizing our product portfolio in order to fulfill the needs of our customers," says Diana Peninger, director strategic marketing of Celanese Emulsions. New acrylic emulsions for outdoor paints and a new generation of VAE emulsions for emission-free indoor paints have been launched recently.

• **Crompton Corporation's** Witcobond aqueous polyurethane dispersions business offers a full product line of waterborne grades used in coatings, adhesives, and ink applications.

The company introduced two new solvent-free products: Witcobond W-281F, a 40% solid-aliphatic aqueous polyurethane adhesive, and Witcobond W-290HSC, a high-solids content (62%) waterborne polyurethane dispersion. W-281F exhibits high-cohesive strength and is an excellent laminating adhesive for PVC to a variety of substrates as well as for laminating fabrics to TPUs (thermoplastic urethanes). W-281F is also suitable for formulation in plastic and leather coatings, particularly for post-application embossing. W-290HSC offers outstanding yellowing resistance when subjected to end-use processing temperatures as high as 140°C. It is particularly suitable for applications in plastic coating, textile coating, fiberglass sizing, and PVC lamination.

In July 2003, Crompton sold its OSi Specialties Organosilicones Unit (urethane additives business) to General Electric in exchange for $645 million in cash plus GE's plastics additives business and $105-250 million in quarterly "earn-out" payments. Crompton used the proceeds to reduce debt and increase sales of its polymer additives business. Both Crompton and GE continue their commitment to the coatings market even though they are now under separate ownership.

• **Degussa's** resins business includes polyesters for coil and can coatings and specialty resins (synthetic, adhesion, and polybutadiene resins) for improving the adhesion, flow, and corrosion resistance characteristics of coatings. The crosslinkers business offers isocyanates, polyisocyanates and blocked polyisocyanates for light- and weather resistant polyurethane coatings as well as raw materials for powder coatings.

The Coatings & Colorants Business Unit of Degussa plans to build a colorants plant and a manufacturing facility for producing coating polyesters at its Degussa Chemicals (Shanghai) Co. Ltd. facility. The plant will manufacture high-quality product solutions for the Chinese paint and coatings market. "By investing in these new state-of-the-art facilities, Degussa Coatings & Colorants is confirming its belief in the dynamic future of the Chinese market, as well as its commitment to supporting its clients on a global basis," says Werner Freitag, senior vice president, resins with Degussa.

• **The Dow Chemical Company** has several different businesses that offer resins to the coatings market. The epoxy products and intermediates (EP&I) business at Dow produces liquid, solid, flexible, and brominated epoxy resins; epoxy novolac resins, epoxy hardeners; and a line of acrylic monomers. In addition, Dow produces many raw materials used in the production of these resins.

"In the epoxy business, Dow is committing resources toward developing resins and technologies that will help customers develop more compliant coatings," says Mr. Merino. In particular, Dow is working on the development of waterborne epoxy resins, high-solid content liquid epoxy resins, solid epoxy resins for powder coatings, and epoxy resins and epoxy acrylates for UV-cure applications.

XZ 92478.0 is a modified solid epoxy acrylate resin for UV-curable powder coatings, offering a fast curing, reactive diluent-free coating system. XZ 92551.00 is an epoxy acrylate resin with a very low viscosity that requires significantly less reactive diluent and offers enhanced yellowing resistance and flexibility. Dow Dispersion Technology is a proprietary new technology used to produce extremely uniform and shelf-stable, waterborne UV dispersions.

A new 41,000 MT/year converted epoxy resin (CER) facility in Zhangjiagang, The People's Republic of China, began production in 2003. Dow has also announced that it intends to expand the facility to include an 80,000 MT/year liquid epoxy resins production facility but has delayed the expansion until market conditions improve. Phil Cook, Dow EP&I vice president emphasizes that this is a delay and not a cancellation.

Dow Polyurethanes offers a wide range of core polyurethane materials for use in coatings including polymeric MDI, pure MDI, and polyether polyols. "Dow looks upon the coatings segment as a strategic, long-term growth market and continually invests in research for innovative chemistries to meet unmet customer needs," says Mr. Reardon. Dow is leveraging its Dispursa polyurethane dispersion technology and Syntegra waterborne polyurethane dispersions into coatings applications. Dispursa provides a cost-effective method for making low-solvent, low-VOC polyurethane dispersions. Syntegra polyurethane dispersions provide higher solids content, better stability, and more robust performance. "These products give customers the opportunity to use dispersions in applications where they previously were cost prohibitive," notes Mr. Reardon.

The main latex resins products of UCAR Emulsion Systems (UES), a business unit of Dow, are UCAR vinyl acrylics, acrylics, and styrene acrylics, NeoCAR branched vinyl ester latexes, and Polyphobe rheology modifiers used in interior and exterior wall and trim coatings.

• **Eastman Coatings** offers waterborne resins, powder resins, UV resins, and conventional solventborne resins that find applications in the architectural and industrial markets.

Eastman introduced several new powder coatings resins to the North American market. Albester 6310 is a durable hydroxyl functional polyester designed to maximize weatherability. Albester 5250 is a reduced-cost TGIC cure polyester that requires less curing agent to develop full properties.

In August 2003 Eastman announced that it will be taking steps to improve profitability of addressing under-performing businesses and product lines including its acrylate ester monomers, liquid resins, powder resins, composites (unsaturated polyester resins) and others. Strategic alternatives include restructuring, divestiture, and consolidation.

• **Engineered Polymer Solutions/Color Corporation of America (EPS/CCA)** is a supplier of emulsions, resins, and colorants to the coatings and construction polymers markets. The company principally services the architectural, industrial, maintenance, aerosol, coil coating, wood flooring, general metal coating, and polymers for concrete markets.

EPS/CCA continues to introduce new emulsions to offer a full range of gloss options for the architectural market with the theme of "VOC compliance without sacrificing performance," according to Mr. Bunch. The company is also continuing to improve upon its core technology offerings in tannin block primers and direct-to-metal emulsions. In support of its growth in the emulsion market, EPS/CCA is currently constructing a grass roots emulsion latex plant at its Hagerstown, MD, site.

• **Huntsman** serves the coatings markets through its advanced materials (formerly Vantico), performance products, pigments, and polyurethanes businesses.

Huntsman Advanced Materials was formed following the restructuring of Vantico by Matlin Patterson Global Opportunity Partners and the transfer of the business to HMP Equity Holdings, its partnership with Huntsman LLC. The business offers coatings and structural composites, adhesives, tooling, electrical and electronic insulation materials to a wide range of industries. Huntsman recently introduced three hardeners for waterborne solutions—Aradur 3985 S and Aradur 3985 for thick layer applications and Aradur 3986 for corrosion protection systems. Aradur epoxy resins have ideal properties for use in sectors such as civil engineering, marine maintenance and offshore construction.

Huntsman Performance Products offers amines as curing and neutralizing agents for water-based dispersion coatings; dispersants, surfactants, and carbonates technology used in paints and auto coatings; and chain tive coatings market," says

Photo courtesy of Dow Chemical Co.

Spray epoxy.

Photo courtesy of Dow Chemical Company.

Stefan Stein, marketing manager, Huntsman Polyurethanes ACE.

• **Johnson Polymer** offers a complete line of acrylic polyols, polyurethane dispersions, acrylic emulsions, solid acrylic resins, and additives for waterborne and solventborne liquid coatings, along with powder coatings. The company has recently launched a new series of self-crosslinking acrylic emulsions. Joncryl 1982 and Joncryl 1984 offer improved hardness, excellent chemical resistance, and low yellowing. Johnson Polymer has also introduced a new line of acrylic polyols with very fast cure and hardness development for two-component urethane coatings. Joncryl 942 and Joncryl 945 are capable of developing early hardness at very low VOC.

• **Reichhold** is a leading producer of alkyds, acrylics, polyesters, and urethanes engineered for use in architectural, industrial maintenance, OEM, powder coating, and graphic arts applications. Reichold is also a global supplier of unsaturated polyester resins for composites applications in a wide variety of processes and markets.

In 2003, Reichhold introduced DV-26358 a first-generation stable waterborne alkyd for low-VOC, high-performance architectural stains, and commercialized Sta-Clad® 6472, a premium acrylic polyol designed for autorefinish and general metal coatings where high scratch resistance, UV durability and good chemical resistance is needed. Most recently, the company launched Arolon 848, an acrylic emulsion designed to produce durable industrial coatings that offer very good corrosion and humidity resistance, even in films as thin as 1 mil.

In the near future, Reichhold will launch a low-VOC, low-odor, high-performance chlorinated-polyolefin modified acrylic emulsion designed for coatings that provides excellent adhesion to polypropylene and TPO plastic substrates. The company has in the pipeline a low-VOC acrylic emulsion designed for metal applications and an innovative waterborne alkyd for industrial applications that is on target for launch by the second quarter of 2004.

Reichhold combined its coatings (formerly known as Global Coating & Performance Resins) and composites businesses into one process-driven organization supporting both the coatings and composites markets, according to Mr. Regele. The company is currently adding 10 million pounds of specialty polyester powder resin capacity to its Valley Park, MO plant and has announced plans to expand capacity at its Morris, IL plant by 35%, with new equipment slated to go online in 2004.

• **Resolution Performance Products** is a leading global manufacturer and developer of epoxy resins. In addition to world-scale supply of liquid, solid and solution epoxy resins, Resolution offers curing agents, modifiers, and waterborne epoxy resin systems for the coatings market.

The company recently introduced its Newgen waterborne epoxies technology with DPW-6520 (solid epoxy dispersion) and DPC-6870 (curing agent dispersion). This binder system is being used in a variety of industrial and OEM applications for anticorrosive primers and DTM finishes. New products developed for waterborne epoxy concrete coatings are planned for release in Europe and the U.S. in the near future.

Resolution Performance Products is actively pursuing development of improved low-temperature curing agents (with cure down to 0ºC) for industrial maintenance and marine markets globally. "As new low temperature cure hardeners are commercialized, there are opportunities for cross-over into automotive refinish and fast-dry epoxy protective coating applications," says Daniel J. Weinmann, market development manager with Resolution Performance Products LLC.

In June 2003, Resolution expanded the capabilities of its Chicago area resin facility to produce and handle waterborne epoxy resin dispersions. Various manufacturing options for waterborne epoxy resin production in regions outside of the Americas are under consideration as well. Resolution has also enhanced its glycidation capabilities for its Epon and Epikote resins, as well as its Heloxy modifiers, in the U.S. and Europe. New and improved process technology has resulted in these advances, which are intended to increase production efficiency, improve yields, and allow for faster introduction of new products, explains Mr. Weinmann.

• **Rhodia** offers hexamethylene diisocyanate (HDI) and isophorone diisocyanates (IPDI)-derived products and monomers designed for use in many high-performance polyurethane systems including automotive paints, coil coatings, maintenance coatings, and adhesive applications. The company has expanded its existing list of products with complementary offerings in addition to having several new products in the early commercialization stage. Rhodia also plans to debottleneck some of its operations in 2004, according to Mike Quinn, general manager, Rhodia performance products for multifunctional coatings.

> Investing in R&D is not only critical these days, but is imperative for creating new solutions for the customer and therefore is essential for future business.

**Rohm and Haas Company** offers a wide variety of acrylic waterborne polymers and solventborne resins for the coatings market. Its polymers are used in a wide range of interior and exterior architectural coatings and industrial applications. Rohm and Haas introduced several new resins recently. Designed for use in the lower VOC concrete sealer/paint markets, Paraloid B-56, 100% resin offers minimum application solids of 25% and viscosity suitable for application with standard low-shear deck spraying equipment. It is also suitable for general metal applications, maintenance coating uses, plastics coatings, and as a letdown (in combination with nitrocellulose) resin in gravure inks.

Rhoplex HG-700 100% acrylic ambient crosslinking emulsion polymer is the company's new offering for VOC-compliant gloss and semigloss enamels. Rhoplex EC-3814 100% acrylic polymer emulsion for elastomeric wall coatings offers an excellent balance of elongation, tensile strength, and dirt pick-up resistance over a wide temperature range. Rhoplex SG-30 100% is designed to meet the needs of new regulations for 150 g/L VOC semigloss interior and exterior architectural paints while maintaining key properties of conventional products.

Photo courtesy of Sartomer Company.

"Rohm and Haas continues to develop binder and additive solutions to meet the pending reduced VOC regulations," says Mr. Johnson. Additional new products will be introduced in the near future.

• **Sartomer Company** offers low molecular weight resins, functionalized and hydroxyl-terminated polybutadiene resins, modified aromatic resins, and oligomers. Their products find applications in powder coatings, overprint varnishes, pigment dispersions, waterborne coatings, UV-cure coatings, metal and concrete coatings and UV/EB, two-part epoxy/amine and peroxide-cure coatings, and alkyd resin-based marine coatings.

Recently Sartomer introduced three new products: CN750, a polyester acrylate oligomer for UV/EB adhesives, coatings, and inks; CN9001, a urethane acrylate oligomer for UV/EB coatings (metal and plastic) and inks; and CN2258, a polyester acrylate oligomer for UV wood coatings. CN750 is designed to enhance adhesion to a variety of commonly used plastics. CN9001 exhibits excellent resistance to yellowing as well as retention of gloss properties during accelerated weathering tests. CN2258 imparts exceptional abrasion resistance, high flexibility, and impact strength.

In April, 2003, Sartomer joined the Elemica e-Business Network and now offers its products to members of the Elemica Network.

• **Surface Specialties, Inc. (UCB)** provides a full range of powder resins, UV resins, liquid coating resins, and problem solving additive solutions. The acquisition of Solutia's coating resins and additives business unit was fully complimentary to UCB's powder resins and UV resins business. Renaming the coatings business as Surface Specialties UCB reflects the company's capabilities.

The company introduced several new products to the market in 2003, including new advances in Resydrol alkyd emulsions, Beckopox waterborne epoxy dispersions and hardeners for metal substrates, and Beckopox waterborne epoxy crosslinkers for outstanding gloss, adhesion, and potlife characteristics for concrete coatings.

For the automotive industry, Surface Specialties launched Macrynal VSM 1004, a solventborne acrylic polyol for 2-K automotive refinish applications and two Daotan polyurethane dispersions for 2-K automotive interior applications

Other new products include the Duroxyn brand, a unique, high performance air dry epoxy-ester emulsion with superior corrosion performance; Raylok, a new range of performance products for the EB/UV curable coatings market; and ViaGraph, a complete line of performance products for radiation curable inks. CT