

Resin Review:

Juggling Costs, Regulations, and the Need for Innovation

by Cynthia Challenger
JCT CoatingsTech
Contributing Writer

For resin manufacturers, it looks like 2008 will be a year for managing a number of different challenges. Spiraling energy and raw material costs will impact all aspects of operations. Regulatory compliance—particularly European REACH registration—will consume additional resources. The slow-down in the North American housing and auto markets will have a trickle-down effect on other segments and affect the growth rate in emerging regions as well. Many producers are looking to innovation as a means for maintaining competitiveness and profitability in such a climate. With all of these cost pressures, though, it will be another challenge to find the funding necessary for effective R&D and new product development.

Growth in the mature U.S. coatings market has slowed to just 1% per year, according to Steven Nerlfi of consulting firm Kusumgar, Nerlfi & Growney. He expects this rate to be maintained through 2011. "Demand for solvent-based coatings is declining. Consumption of cleaner coating technologies, while increasing moderately, is not growing at a rate significant enough to dramatically overcome these losses. Naturally, demand for various resin types will reflect these conditions in the U.S. coatings market."

Despite a decline in volume of sales, though, paint and coating producers in the U.S. managed to increase revenues from 5 to 10% in 2007 through price hikes and product mix effects, according to Daniel S. Murad, president and CEO of The ChemQuest Group, Inc. Globally, revenues in the paint and coatings industry were up 10-12%. "The resins market has had a similar experience," he notes, "and has been particularly disciplined and successful at passing along rising costs."

That discipline will be necessary throughout 2008 as well. "Many companies expected the price of oil to remain at \$70-\$80/barrel and planned accordingly. Now that oil is hovering around \$100/barrel, we expect to see resin manufacturers pushing for price increases through most of the year," Murad explains.

"Resin companies operate very lean so no amount of internal cost savings can offset the impact of the raw materials. As such, they will continue to

be passed on down the supply chain," agrees Tony Rende, director of business management for Reichhold's North American Coatings business. He also believes that resin industry leaders have pretty much adjusted their pricing philosophies to quickly respond to the changes in oil prices.

Higher oil and natural gas prices affect all aspects of operations, not just raw material and energy costs. "In the short term, the obvious impact is the subsequent effect on total costs," says Dan Latas, marketing manager, Resins and Polymers, Lubrizol Advanced Materials, Inc. "Longer term, it will impact R&D and product development portfolios. There will be more focus on using renewable resources as well as on less energy-consuming technologies, in both the production and use of resins," he adds.

According to Ken Bourliet, marketing manager for Rhodia's Industrial Coatings (INCO) North America business, all costs associated with oil and natural gas, such as raw material feedstocks, power generation, and transportation, have been increasing dramatically as well. Some of these costs are absorbed by raw material producers, but a proportion is also passed on to downstream consumers of these products.

Resin manufacturers face the key issue of sustaining profitable growth while at the same time needing to balance margins, formulated costs, and the overall health of the business. "And all of these activities must be achieved in a sustainable way," insists J. R. "Rusty" Johnson III, North American marketing manager of architectural binders, paint, and coatings materials for Rohm and Haas Company.

The economic slowdown in the U.S. is magnifying the impact of higher oil prices for resin producers in North America and Europe as well. The housing slump has affected not only the architectural segment, but all sectors that can ultimately be connected back to new construction—furniture and appliances, for example. The auto sector does not hold much promise, either. Auto sales in mature countries are expected to remain flat in 2008, while refinish sales continue to decline.

Fortunately, the financial difficulties in the U.S. should not have as great an impact on emerging markets as might have happened a decade ago. "Emerging markets are much more robust domestically and much less dependent on exports," Murad comments. "The rate of growth will definitely decline somewhat, but these markets will still experience healthy demand in all segments of the paint and coatings industry."

The importance of emerging markets to companies around the world reflects the continued globalization of the paint and coatings industry. Resin producers must position themselves to efficiently supply their global customers while at the same time preparing for

future competition from companies located in emerging regions that could quickly become global players.

"Asia is in an accelerated growth mode," says Phil McDivitt, vice president of emulsions for Celanese Corporation. "We need only look at the rapid pace of change in Asia to realize that the growth momentum will be with us for a while. A commitment by the government of China to support environmentally friendly products as well as increasing consumer demand for environmentally friendly products and efforts by companies such as Celanese to support the use of beneficial polymer technologies in new coatings formulations is further proof that demand will grow dynamically in the years ahead," he adds.

Celanese is investing heavily in the region in support of its strategy to enhance reliability of supply and meet demand for the global market. New facilities in Nanjing, China, will be onstream in 2008 and point to "Celanese's total commitment to the fast-growing economies of Asia and leveraging China as a platform from which to supply the needs of our customers globally."

"Emerging markets continue to grow in importance and prominence, and the impact and progress made to penetrate these markets in even a year's time is remarkable," Latas states. "The ability to economically supply resins of equal quality and performance anywhere in the world is now the requirement, not the exception, for participating in all regions of the world." He also believes that knowledge of chemical inventories and regulatory compliance is more often than not the key to getting a door opened.

Capacity, in fact, as far as John Cech, general manager for CVC Specialty Chemicals, Inc. and president of the Thermoset Resin Formulators Association (TREA) is concerned, remains a very large issue for resin manufacturers. "Supply is tight and it is likely to remain so through this year. The cold weather will be a time to try to build inventory but continued growth in overseas markets and the approach of warmer weather will again put pressure on suppliers," he says.

Many companies, including CVC, are trying to de-bottleneck to meet short-term needs while also looking at expansion to meet long-term requirements. CVC specifically is completing a major de-bottlenecking plan that will help open up more capacity for Bisphenol A and phenol novolac epoxies.

Another aspect of globalization is the high level of consolidation taking place within the paint and coatings industry. The acquisitions of ICI by Akzo Nobel and Sigma Kalon by PPG Industries are just two of the latest deals that are changing the landscape. Larger companies are getting larger, and are expected to continue to buy up smaller, regional firms. As they grow, these major players gain greater purchasing power,

which has a direct impact on resin suppliers. Latas adds that following a merger, resources typically are diverted from evaluating new resins and developing new products to consolidating the companies.

"Consolidation will likely affect smaller resin players the most," Murad comments. "The larger resin producers have sophisticated systems for managing pricing and will be able to respond appropriately to these changes. Smaller players will find it much harder. As a result, consolidation within the resin sector will pick up."

Cook Composites and Polymers (CCP) product manager for Liquid and Powder Resins, Dennis Ryer, adds that, "It behooves resin manufacturers to remain close to the major paint companies as their situations change. As the small to mid-size companies disappear, the customer base shrinks and in many instances the resin manufacturers need to deal with customers who have in-house resin capabilities. This fact forces the resin manufacturers to differentiate themselves on quality, service, price, and technical innovation."

"Our customers are all getting global and expect resin manufacturers to understand our respective markets so we can deliver on innovation and best-in-class product and service, in all parts of the world," adds Shruti Singhal, marketing manager, Industrial Finishes and Traffic Paint, Paint and Coatings Materials, North America, with Rohm and Haas Company.

Globalization has also had regulatory implications as well. With the pre-registration date for the European Union's REACH legislation coming up in June and stricter VOC regulations being implemented in various regions of the U.S. and around the world, resin manufacturers also expect compliance efforts to consume additional resources.

The California Air Resources Board has reached agreement on their next round of VOC legislation that will go into effect in 2009, according to Steve Wilson, marketing manager for Coating Resins at Elikem. He also notes that the U.S. EPA is revisiting the 1999 national standards and the Ozone Transport Commission (OTC) is talking about phase two of its new requirements. "Changing VOC regulations provide resin manufacturers opportunities to develop new resins that can be formulated to meet lower requirements without compromising performance," he asserts.

It is difficult to predict what type of new regulations or controls the industry will face in the future. "Given today's political climate and the heightened awareness of greenhouse gas emissions, hazardous air pollutants, and ozone reduction initiatives, we believe we will continue to see more controls placed upon the volatile emissions from paint formulations as well as chemical production facilities," Bourdier says. "I also expect the industry will adapt to these regulations without significant problems as they have done in the past."

If resin producers have been properly preparing, they should find significant opportunities created by the continuing evolution in regulatory requirements, according to Yasmin Sayed-Sweet, strategic business director with Alberdingk Boley, Inc. and current president of the FSCI. "We have taken a very proactive approach to the regulatory issue and believe that because of these efforts we have a lot to offer the industry and the marketplace and are well positioned to benefit from the opportunities created by changing VOC requirements," she notes.

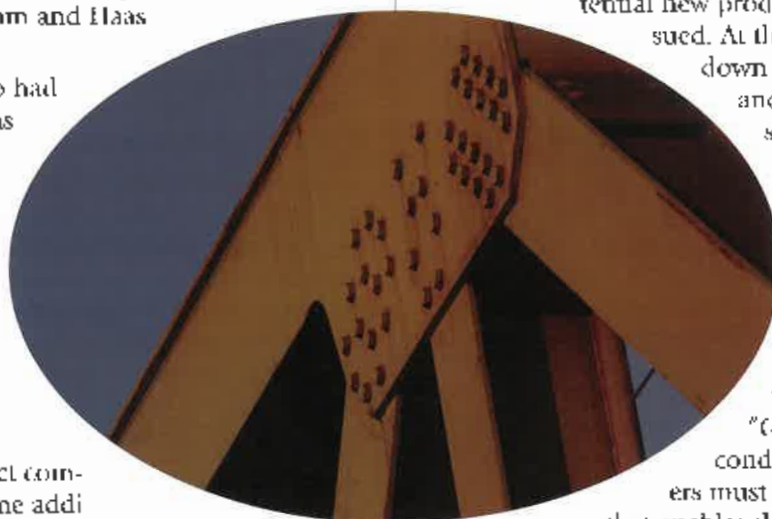
Europe may be another story, though. "REACH will definitely impact the coatings industry, including resin suppliers," says Murad. "Critical mass is necessary to afford the cost of registration and compliance. Many commercial products will be withdrawn, and other potential new products will never be pursued. At the very least it will slow down product development, and most likely stop it in some cases."

And the idea of reducing product development is frightening for many who see innovation as the only means for overcoming the numerous challenges the resin industry faces.

"Given the current market conditions, resin manufacturers must maintain a balancing act that enables them to develop value-added, innovative technologies while at the same time lowering their costs," asserts Murad.

For Reichhold, it is the lack of innovation in the coatings market on the formulated coatings side that is of concern. "Much of the development over the past few years has been targeted at reducing VOC emissions and taking cost out. The end result is an industry with very little product differentiation," states Rende.

He believes that for companies to prosper in this environment, especially those companies that do not own their channel to market, they will need to develop



more innovative and differentiated products. "The only way to achieve that goal is to invest in technology and technical resources and place greater emphasis on recruiting young people into the industry."

The drive for innovation and product improvement can come in a number of ways, as there are many possibilities for reducing costs.

"We see smart coatings as affording the resin sector significant opportunities in the future," Murad notes. Self healing coatings for corrosion detection and resistance and scratch resistance and recovery, for example, will require new resin technologies that bring about the desired performance.

Clariant, with the acquisition of KiON Specialty Polymers in 2006, looks to take advantage of such opportunities. KiON offers polysilazane resins with release, corrosion protection, and heat protection properties, according to new business development manager, Gregg McCraw. Following the acquisition, Clariant established full scale commercial production of the resins in India. Previously, they were only available on a pilot scale.

The company has already demonstrated success with the resins in permanent anti-graffiti coatings. "We have been very active in developing polysilazane resin technology for downstream applications and are committed to continued innovation and strengthening of the product line in 2008," states McCraw.

Celanese has incorporated nanotechnology into some of its products. Its Celvolit® Nano 9620 acrylate/silicon dioxide (SiO_2) emulsion technology has been specifically designed for high performance exterior paints. "Coatings formulated with Celvolit Nano 9620 create a nano-particle structure in the paint film, resulting in outstanding outdoor weathering behavior with remarkably low dirt pick up," explains McDivitt. He adds that the nanostructure also helps paints achieve the highest quality standards for water vapour permeability. Also in this product line are Celvolit 7620 and Celvolit 7605 acrylic resins for water-based coatings.

Resin manufacturers providing systems that enable customers to meet regulatory requirements and the increasingly "greener" demands of the consumer will create a competitive advantage as well. "Aside from promoting value and quality to combat the recent pressures on profitability, the industry needs to focus on developing technologies that are sustainable in the face of challenges for carbon emissions," comments Nader Arang, head of business development for Estron Chemical.

Estron's all-acrylic Lumicryl energy curable macromers provide unique product properties and formulating latitude for 100% solids or solventborne systems. The company has also developed the concept of "two-step (dry



cure) application technology," according to Arang. Coatings based on Lumicryl U-721S dry to a tack-free state to allow intermediate processing such as stamping, molding, forming, re-coating, laminating, and/or thermal transfer prior to cure. He expects Estron to introduce several new products in 2008.

Rhodia, according to Bourlier, has taken a broad-based approach to sustainability, updating and investing in production facilities while taking a proactive position with regard to product stewardship and developing strong community relations. "We have also cultivated strong customer relationships that help us drive innovation based upon clearly designed customer needs," he notes. Rhodia has also positioned itself to have efficient and economically competitive production facilities along with appropriate staffing to take advantage of opportunities in emerging markets.

Specific product technology at Rhodia has focused on water-emulsifiable isocyanates. In 2007, the company commercialized a new, ready-to-use hydrophilic polyisocyanate, Rhodocoat™ X EZ-D™ 803, that, according to Bourlier, retains the excellent performance properties of standard aliphatic isocyanates but delivers easy mixing in water-based formulations, fast dry, and very low odor when used indoors in applications such as concrete or wood polyurethane coatings.

Listening to its customers, meeting its customers' needs, and establishing long-term partnerships is a key to success at Rohm and Haas, according to Johnson. "The company is also using technology to drive the cost-performance level of paints and coatings higher. We also see a deeper need to understand and broadly embrace green chemistry in order to develop innovative high-performance products that exceed regulations and reduce the impact on the environment of all that we do, including improving air quality, reducing fuel costs, and having manufacturing plants closer to customers."

New environmentally advanced products from Rohm and Haas include its Avanse™ MV-100 binder for

direct-to-metal applications and its Maincoat[®] FG-11 and FG-31 waterborne resins for elastomeric coatings applied to metal and cementitious substrates and water-resistant coatings for masonry and steel, respectively. The company has also recently introduced RoShield[™] 636 binder, which provides one-component, self-crosslinking technology for kitchen cabinet finishes and for sealers/topcoats for molding and interior board. On the architectural side, Rohm and Haas introduced Rhoplex[™] VSR-1050 binder, a 100% acrylic emulsion featuring advanced acrylic technology for flat to semigloss architectural paints.

Reichhold has also focused on developing alternatives to traditional solvent-based products. In 2007, the company launched its zero-VOC, biobased BECK-OSOL AQ[™] alkyd latex products for architectural applications. According to Reichhold's coatings technology director, Carl J. Sullivan, these binders provide exceptional adhesion in waterborne primers and provide high gloss development in formulations that are less than 50 g/l VOC. In 2008, the portfolio will be expanded to include products for wood, concrete, and metal substrates.

In addition to product introduction based on customer needs, Reichhold's strategy for growth includes manufacturing and channel expansion domestically and overseas, technology and business acquisition, and investment in basic technical resources. The company increased capital spending in 2007 and plans to continue investments into the future, according to Rende. Reichhold's Indian facility will become operational in 2008 and activities in China will be onstream in late 2008 or early 2009. In addition, Reichhold made significant capital investments in existing plants to increase capacity, streamline production, and increase its regional ability to service customers.

Eliokem introduced several new low-VOC products in 2007. Pliotec CR30, PA05, and PA91 are latex resins designed for high performance. CR30 is suited for garage floor coatings; PA05 for concrete sealers, wet look pavers and stains, concrete cure and seals, and PA91 for porch and floor coatings. The company expanded processing and packaging capabilities and moved to a 24/7 production schedule at its Akron, OH plant in order to meet increased demand. Eliokem also acquired a polymer production site from Apar Industries that manufactures nitrile rubber in India.

Along with its investments in Asia, Celanese continues to focus on bringing its low-VOC vinyl acetate/ethylene (VAE) emulsion technology to North America. According to McDivitt, VAE emulsions can be formulated into premium quality paint without the addition of plasticizers or other coalescing solvents. The company is preparing to move into a new technical service laboratory in Houston, TX, dedicated to the

development of new emulsion products and solutions for the paint and coatings industry.

Alberdingk Boley introduced solvent-free and NMP-free polyurethane dispersions and products based on renewable resources to the marketplace in 2007. Albodurs resins are 100% solids, zero-VOC polyols derived from castor oil that are designed for concrete and flooring applications. Alberdinky Boley's M products are environmentally friendly resins for concrete and metal; it has also introduced water-based UV curables for woods and plastic surfaces. These types of efforts will continue in 2008, according to Sayed-Sweet.

CVC Specialty Chemicals, Inc. entered a niche market in 2007 with the new low viscosity EPALLOY[®] 5200, a cycloaliphatic epoxy resin. The product is designed to replace another cycloaliphatic epoxy that was abruptly withdrawn from the market. According to Cech, EPALLOY 5200 is expected to find good use in electrical casting applications where cure speed, UV stability, and good electrical properties are important.

Even incremental technological developments that help customers reduce costs and increase efficiencies will be of value. "New technologies that enable customers to increase process and/or operational efficiencies will be critical for resin producers and paint and coatings manufacturers both," Murad remarks. "These technologies could take the form of reformulations, faster curing ability, higher solids content, etc.—anything that will help their customers improve efficiency, lower cost, meet global regulatory requirements, and also satisfy their customers' needs."

Lubrizol is striving to continue to improve its operational efficiency to maintain competitiveness in the markets it serves, according to Lelas. The company is also focusing more heavily on improving the success rate of R&D projects, especially those involving renewable resources and targeting environmentally friendly applications.

John Cech notes that 2007 was relatively quiet with respect to technology advances, in large part due to the pressure on resin producers to focus on improving operating efficiencies rather than invest in fundamental



new technology development. "The move to bio-based feedstocks was fairly significant in 2007, but this effort was hampered due to the rising cost and limited availability of naturally derived oils in response to growing demand for biodiesel production. This situation will continue to affect coatings," says Cech.

Some companies are taking a multi-faceted approach to technology development. CCP is focusing on technically driven products, manufacturing efficiencies, improved quality, cost control, and close customer relationships, according to Ryer. Short-term efforts target cost control, productivity, and quality, and have included waste minimization, reduction of process times, and improvement in quality measurements. Medium and longer-term initiatives involve development of new technology platforms in alkyd dispersions, alkyd emulsions, reactive diluents, and high-solids products for both air dry and chemically cured systems.

Chempol® 821-1391 is a fast dry low-VOC acrylic alkyd dispersion for both industrial and architectural applications that can be used in high gloss topcoats over metal, wood, and plastic. The company plans to introduce in 2008 a short chain stopped alkyd emulsion and a medium oil alkyd emulsion, both of which are low odor and essentially zero-VOC products, according to Ryer. They are higher solids than alkyd dis-

persions, are suitable for high gloss architectural applications, and can be used alone or as a modifier for acrylic emulsions. The alkyd emulsions are suitable for air dry, baking, or two-component urethane systems.

The strategy of Nuplex Resins consists of managing raw material volatility, achieving greater operational efficiencies, increasing customer satisfaction, and developing stronger and longer-term relationships with key cus-

tomers, according to Sanjay Luthra, business manager—industrial markets with Nuplex Resins. It also includes helping paint companies address the impact of VOC regulations and working closely with them on new product development and global technology transfer that truly provides additional value to their customers through joint creation of solutions.

Initial results of this strategy can be seen in Nuplex's newest product introductions, the Setaqua® waterborne product family of specialty acrylic dispersions and acrylic and alkyd emulsions for the coatings, adhesives, and construction markets. The products provide solutions to address environmental regulations as well as increased performance.

Setaqua 6736 is a self crosslinking acrylic emulsion that provides excellent in-can and film clarity as well as rapid dry time and hardness development in both clear and pigmented furniture and parquet coatings. Setaqua 6802 is an acrylic emulsion that has "built in" rheology that leads to improved application properties and appearance by providing metallic flake orientation and sag resistance in automotive OEM, plastic, and refinish coatings. Setaqua 6511 and 6513 are hydroxyl functional acrylic resins recommended for use as co-reactants with aliphatic polyisocyanates for use in two-component, waterborne polyurethane coatings for industrial and automotive applications. Setaqua 6004 is a fast-drying urethane modified alkyd emulsion that is recommended for use in industrial metal and wood coating applications.

"Nuplex Resins also recently acquired the C-Cure® acrylic polyol product line from Cognis Corporation in November 2007, broadening the company's product portfolio and enabling value creation for paint companies in North America and globally," says Luthra. The company has upgraded its manufacturing to support the business growth of the C-Cure acrylic polyol family and Setaqua waterborne polymers.

No matter what specific strategy is adopted by resin manufacturers supplying the paint and coatings industry, in order to remain competitive, companies must continue to innovate. "Companies that can offer technology that meets customer needs will have less to fear from the competition," notes Sayed Sweet. "In fact, development of novel technology is critical in order for resin manufacturers to be successful under current market conditions."

"Individual companies have to continue managing their manufacturing and overhead costs, and increase sales by providing exceptional value to the paint companies in the short and the long term," asserts Luthra. "Building on core competencies and human resources and making the right choices for marketing and new product development projects in alignment with market needs and key customers will also be critical," he continues. "In many cases, tough decisions will have to be made to shift resources from traditional product lines and markets to new ones, and make appropriate investments for future growth." □

