

# 2008

## Market Review: *The End User Perspective*

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**T**o say the least, 2008 has been an interesting year in the U.S. coatings market. The economic downturn had a dramatic effect on demand for architectural and automotive coatings. Rising raw material and energy costs also took their toll. And while the industry was still adjusting to the mergers of major formulators in 2007, several suppliers announced their own significant consolidation plans.

Throughout this turmoil, end users continued to focus on the need for new technologies that address performance, environmental, and cost issues. These expectations will remain central driving forces in 2009.

### COATINGS MARKET IN 2008

The mature coatings market in the U.S. saw an overall sales decline in 2008, both in value and volume terms. Manufacturers were faced with continued increases in raw material and energy costs in the first half of the year, while demand in the key automotive and housing segments declined as a result of the credit crisis and deteriorating economic conditions.

Several other coating sectors struggled as well, according to Steven Nerlfi, a consultant with market research firm Kusumgar, Nerlfi & Gowney (KNG). Coatings for pre-finished wood and composition flatboard, which is mostly used for exterior siding, experienced a drop in sales. Demand for coatings designed for wood furniture applications also declined further, as manufacturing continued its move to offshore locations.

Some coating segments are holding their own despite the challenging economic conditions. Graphic arts applications do not account for a large percentage of the volume of coatings sales in the U.S., but they are mostly UV-cured coatings and carry a high price tag. "This market will not be nearly as hard hit as the automotive and architectural segments," says Nerlfi. "There

will always be a need for annual reports and marketing brochures, and because these publications reflect the image of the company, high-end overprint varnishes will always be in demand."

Metal furniture is a small part of the market, but most manufacturing remains in the U.S. and coatings demand in this segment is growing at about 4% per year. Pipe coatings are another small market, but Nerli predicts a growth rate of 5% per year if drilling for oil begins in earnest on U.S. land.

While some appliance production is moving offshore, the majority of operations remain in America and the market should show positive annual growth of about 2%. Coatings for general metal applications should also experience a similar growth rate.

With a significant amount of farm and garden equipment still produced in the U.S., the machinery and equipment segment should not experience much change in demand. Coil coatings, which are used for a broad range of applications including transportation, metal buildings and other architectural uses (fencing, canopies), and cans, should weather the economic slowdown with little impact on overall sales growth.

In the special purpose segment, there are both declining and growing sub-sectors. The demand for auto refinish coatings will continue to shrink as the number of accidents continues to drop and as more of the vehicles that do get damaged in accidents are replaced rather than repaired. Not surprisingly, sales of marine coatings are down as a result of the slower economy.

Because maintenance must be performed to support infrastructure, demand for industrial maintenance coatings will continue to grow at a steady 2% per year. Legal and regulatory requirements for road maintenance and fire prevention in public buildings will mean there will always be a demand for traffic paint and fire-retardant coatings, so these segments will continue to grow as well.

## TRENDS OVERALL

Overall trends across many of these sectors are similar to those seen in 2007. The first half of the year again saw the industry struggling to pass on price increases to cover the rising cost of energy and raw materials. Crude oil values did fall in the latter part of the year, but Hurricanes Gustav and Ike appeared just in time to cause many plants in the Gulf region to shut down for a time. Fortunately, only minor damage was reported for most facilities in the wake of these storms, and the return of power to the affected regions was the main concern. Even so, many manufacturers were not able to supply materials for some period of time.

Hurricanes were not the only events causing a stir in the coatings market. The mergers and acquisitions

trend continued in 2008, following major acquisitions in 2007 by AkzoNobel (ICI for \$16 billion) and PPG (Sigma Kalon for \$3.04 billion). In 2008, though, the big deals were made in the supplier base. Dow's \$15.3 billion purchase of Rohm and Haas Company, Ashland's \$3.3 billion acquisition of Hercules, and BASF's buying of Ciba Specialty Chemicals for \$5.5 billion will affect the emulsion resins, additives, and pigment sectors, respectively. Just how these moves will play out in the coatings market will be seen in 2009.

Formulators and their suppliers again wrestled with stricter regulation of VOCs and HAPs in 2008. Pre-registration for the European Union's Registration, Evaluation, and Authorization of Chemicals (REACH) initiative began mid-year as well. It remains to be seen exactly what impact this program will have on U.S. companies, both in terms of the cost of registration and availability of raw materials.

On the technology front, the development of "greener" products and more sustainable technologies was a primary driver for new product introductions. Low- to no-VOC high solids, waterborne, or powder coatings remain of keen interest to coatings producers and their customers. UV/EB cured coatings continue to

## Paint and Coating End Use Segments

### OEM

- Automotive
  - Assembly plant applied
  - Tier II supplier applied
  - Tier III supplier applied
- Graphic arts
- Coil coatings
- Wood furniture and fixtures
- Metal furniture
- Pre-finished wood/composition: flatboard
- Pipe coatings
- Appliances
- Packaging
- Aerospace
- Electrical insulation
- General metal
- Machinery and equipment

### Architectural

#### Special Purpose

- Automotive refinish
- Industrial maintenance
- Roof coatings
- Marine
- Traffic paint
- Aerosol coatings
- Fire retardant coatings

*Source: Kusumgar, Nerli & Gowney*

gain a foothold in many sectors where the technology is appropriate. Coatings containing resins and additives derived from natural raw materials are also receiving attention.

## END USER VIEW

Innovation, in fact, will be critical if coatings formulators want to meet the needs of end users. For the aerospace industry, performance enhancement, environmental concerns, and worker health and safety are driving advances in coatings technology, according to Dr. Jill Seebergh, an associate technical fellow and specialist in coating technology at Boeing Phantom Works, Boeing's advanced, central R&D unit. "Beyond the traditional yet critical decorative and protective functions, aerospace coatings are being increasingly relied upon to provide multifunctional properties to enable fuel efficiency, weight savings, and reduced maintenance costs," she explains.

Consolidation of capabilities is also a priority for end users. To be considered for aerospace applications, new coatings will have to combine all of the desired performance properties and environmental requirements into a system that does not add weight, flow time, or cost. "Multiple layers of single-function coatings will not, in general, be a viable option," says Seebergh.

In the automotive industry, a strong focus has been directed towards the development of lean processes. Wet-on-wet-on-wet application technology that eliminates a primer booth and oven, resulting in significant cost savings, has been of high interest

in the auto industry. The key, of course, is to maintain the desired performance levels. The first such process was introduced by Mercedes in 1997 and was based on a water/water/water slurry system, but it had performance issues. Mazda then introduced a medium solids equivalent in 2004.

Ford chose to pursue a high-solids approach, which it launched in 2007 at a plant in Ohio. According to Tim Weingartz, head of Paint Material Development and Release at Ford Paint Engineering, the company plans to implement the system at several other locations in the U.S. and ultimately expand it to Europe and Latin America as well.



The choice by Ford to stay with high-solids formulations is related to sustainability issues. The company has evaluated the life cycle of its processes and determined that from an overall environmental and performance standpoint, high solids are preferable to waterborne or powder coatings. "The total quantity of VOCs is slightly higher with high-solids solventborne formulations compared to aqueous coatings, but more energy is consumed to air-condition booths and to force flash off the water from each coat. As a result, from a CO<sub>2</sub> perspective, the high-solids approach is much more favorable," Weingartz explains.

"Sustainability isn't just about environmental issues, either," he continues. "Product quality and cost are also considered in the equation. With water-based coatings, you do see more film shrinkage and subsequent mapping of the substrate in these three-wet processes. So, solventborne coatings provide superior performance, have a lower cost from an energy consumption perspective, and overall less impact on the environment when CO<sub>2</sub> emissions are considered."

Ford also evaluated a powder/water/solvent combination, but found that powder coatings present their own issues. Most are epoxy resin based and are derived from epichlorohydrin, which has associated with it a non-recyclable stream of chlorine. Bake temperatures

are much higher for powder coatings, and therefore require more energy. Material consumption is also higher in order to achieve the desired level of performance.



New pretreatment systems based on zirconium oxide as a replacement for zinc phosphate are another example of consolidated processes that also

address environmental concerns. Systems developed by Henkel, PPG Industries, and Chemetall eliminate a number of steps, remove manganese and nickel from the process, consume less water, and use less energy.

An environmental issue that the aerospace industry has been dealing with is the removal of hexavalent chromium from primer coatings. The chromium is an ideal corrosion inhibitor, but is being regulated out of coatings formulations due to its toxicity. Development of adhesion-promoting coatings designed to eliminate injurious repetitive sanding processes is another health and safety target, according to Seebergh.

Getting new coatings to end users more quickly is also important. Both aerospace and automotive sectors are interested in the use of new analytical tools to accelerate the development process. "New or improved methods will be required to accurately screen candidate coatings and speed up the timeframes for development, qualification, and implementation," Seebergh says.

She provides two examples: weathering and corrosion. Their assessment requires long-duration tests that produce results that do not necessarily correlate well with in-service data. "Thoughtfully designed accelerated tests based on consideration of the service environment, combined with service life prediction modeling, will be key elements for testing and qualifying the next generation of aerospace coatings," she notes. High throughput screening and computational materials methods may prove useful tools.

Specific targets for development in the aerospace sector include removability and conductivity of composite coating systems. Composite coating systems that are designed with a removal strategy in mind, as well as new depainting technologies, are critical. With respect to conductivity, coating technologies that reduce the effects of p-static and protect from lightning strikes are of interest.

Boeing is also interested in new coatings based on novel polymers and nano-scale materials that can provide properties such as drag reduction, thermal control, self-cleaning, ultra-long service life, self-healing/repair, and structural health monitoring. "Formulation that takes advantage of emerging materials, combined with a thorough understanding of the intended application, will be required for success," says Seebergh.

For the automotive industry, Weingartz would like to see greater use of radiation-cured coatings. UV/EB-cured coatings provide exceptional scratch and chip resistance and long-term durability. The formulations can contain little to no solvents and the application process consumes less energy. "There is a lot of work to be done to overcome the technical challenges related to the use of this technology in an automotive paint booth, but it will be possible one day," he believes.

To achieve that goal, and to develop the same types of multifunctional, high-performing coatings needed in the aerospace sector, coatings manufacturers will have to continue to work closely with their customers. "From a technical standpoint," comments Weingartz, "We have a very strong relationship with our paint supply base and are very happy with them. They have done great quality work for Ford. I expect that tradition to continue." 