

Innovators Will Succeed in Challenging **Industrial Coatings** **Market**

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Industrial coatings encompass a wide range of market segments and serve a number of different purposes. Both factory applied (OEM) and field applied coatings (special purpose) fall under the industrial coatings umbrella. Manufacturers of OEM coatings in some mature regions have witnessed the steady move of their customer base to emerging economies, particularly in Asia, while special purpose coatings have experienced a more favorable environment. Even so, rising raw material and energy costs and continued regulatory restrictions are driving paint manufacturers to develop new technologies that result in overall cost reductions while maintaining or improving performance.

The purpose of industrial coatings is to provide both protection and aesthetics to metal, concrete, plastic, glass, composite materials, and other surfaces. Epoxies, polyurethanes, and acrylics find the most widespread use, but for OEM applications most types of resins still find their way into formulations. Specialty resins including siloxanes and fluoropolymers can also be found in protective coatings. The majority of formulations (as much as 80%) still remain solvent-based today, but high solids, powder, waterborne, and UV-cured coatings are receiving increased attention. Most typical application methods—brush, roller, spray—are used, as are dip and roll coating. Special techniques such as autophoretic application, electrocoating, and spinning are also utilized.

In 2007, the volume of global industrial coatings sales totaled approximately 15 million tons, or about 40% of all coatings demand, according to Information Research (IRL). Regionally, Chinese industrial coatings consumption accounts for 50–60% of total demand, while India claims a 20% share. The North American industrial coatings market achieved sales valued at \$11.3 billion and a volume of 631 million gallons, according to The ChemQuest Group, Inc.



In the OEM segment, which includes coatings for furniture, appliances, general wood, transportation (automotive, heavy truck), and farm equipment, the shift of manufacturing operations to low cost regions of the world has been the prevalent trend and has had a significant impact on coatings producers. "Certain OEM sub-segments—wood products including furniture and flooring and heavy duty trucks, in particular—have suffered permanent loss of coatings demand in North America," stresses Daniel Murad, President & CEO of The ChemQuest Group. Domestic suppliers have followed this migration to the Asia Pacific region via acquisitions and/or green-field start-ups.

This trend has even started to take place in emerging markets as well. "Consumer goods production is being relocated to economies which are now able to undercut former low-cost manufacturing economies," notes Dr. Terry Knowles, business manager at IRL, a division of Business Research Group (UK) Ltd. "This movement has intensified the competition for other producers, who are now required to find other ways of adding value to their business in order to remain competitive."

In China, Knowles notes, salaries are already rising, particularly in the eastern part, where the economy is more developed. "In the long run, we might expect to see some relocation of business to Vietnam, which is a growing paint and coatings base in Asia. Future development of the car industry in Vietnam will also be something to watch for."

In North America, the OEM segment accounted for 59% of the value and 66% of the industrial coatings volume in 2009, according to ChemQuest. Volume declined 0.7% in 2007 and the rate of decline is expected to increase to 5.3% in 2008. Despite the lower sales vol-

ume, the value of OEM coatings did rise by 1.7% in 2007, but producers struggled to pass through price increases to recover higher raw material costs. The economic climate in North America will impact value growth in 2008, though, and ChemQuest predicts it will decline 2.5%. Market share loss of the "Detroit 3" automakers will also have an impact on the OEM sector in this region. Aerospace coatings remain strong but account for only a minor portion of sales for this segment and thus have little impact on overall growth rates.

Unlike their OEM counterparts, special purpose coatings, which include marine and offshore applications, and protective coatings for petroleum and utility equipment and traffic markings, continued to experience moderate growth in 2007 even in mature markets. In North America, ChemQuest estimates that increased spending on industrial infrastructure and maintenance led to the strong 3.4% growth in volume in 2007. Value growth increased by 6.4% as manufacturers of special purpose coatings were more successful at pushing through price increases. The slowing economy will impact this segment of industrial coatings in 2008, though, with volume growth slowing to 2.3% and value growth to 4.0%.

Table 1—OEM Coatings Segments

Auto, light truck, SUV	.17%
Powder	.16%
Wood furniture, kitchen cabinets, and composition flat stock	.12%
Coil, sheet, and strip	.11%
Radcure	.8%
Metal containers and closures	.7%
Metal furniture and fixtures	.7%
Heavy duty truck, bus, RV	.6%
Machinery and equipment	.6%
Electrical insulation	.5%
Other transportation	.2%
Paper, paperboard, film, and foil	.2%
Appliances	.1%

Source: The ChemQuest Group, Inc.

Table 2—Comparison of Chinese and Indian Industrial Coatings Segments (Tons, 2006)

	China	India
Heavy duty coatings	1,018,000	134,000
Automotive OEM	295,000	36,000
Automotive refinish	85,000	14,000
Marine paints	209,000	10,000
Can coatings	na	5,000
Coil coatings	100,000	2,000
Powder coatings	523,000	29,000
Industrial wood coatings	700,000	na
Coatings for plastics	91,000	na

Source: IRI's Profile of the Asia-Pacific Paint Industry, 8th Edition (2008)

For U.S. manufacturers in general, the weakness of the dollar in international markets has had a favorable impact on business. Many are reporting increases in exports of 12–15% for 2008 to date.

Nevertheless, higher raw material and energy prices and the slowing economy will take their toll. Coatings producers are focused on finding “faster, cheaper, and better” ways of applying their products in an effort to save their customers money while maintaining performance.

“To that end, coatings manufacturers are developing coatings that require less material, involve a more efficient application process, and/or offer multiple functionalities,” explains Murad. “Specific examples include thinner films with equivalent performance, more durable coatings that have longer repaint cycles, faster drying/curing formulations, wet-on-wet processes, and

coatings that not only look good and provide protection but also offer other properties such as anti-microbial, odor-reducing, or fire-resistant capabilities.”

Increasingly strict regulatory requirements on volatile organic compounds (VOCs) have driven innovation as well. Much of the advances, to date, however, have been incremental in nature. Growing consumer demand for more eco-friendly, sustainable products will have a greater impact in the future. “We are early in the life cycle of this trend but there is definitely a ground swell of activity within the R&D groups at most paint companies, and I expect the ‘green’ movement to become an important aspect of the industrial coatings market in the coming years,” comments Murad.

DuPont Coating Solutions has a similar view. According to David Lazzeri, business director for the Americas, taking a sustainable approach is not only the right thing to do, but is necessary to meet customer expectations. “Five years down the road, decisions based on sustainability factors won’t be remarkable anymore, but simply the standard way of doing business.”

Maintaining competitiveness in those five years, which will be very challenging for industrial coatings producers given the global eco-

nomic situation and rising crude oil prices, will require a commitment to innovation. “For the past two decades, coatings manufacturers have been focused on reducing costs, and R&D activities have been trimmed on a regular basis during that period,” Murad says. “It will be no small task to bring about a 180° change in how management views the role of R&D.” Efficient management of the supply chain and securing of raw material sourcing will also be imperative.

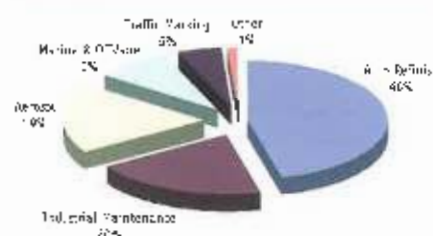
Do coatings producers and their suppliers agree with this assessment? JCT CoatingsTech posed this question to a few players in the industrial coatings marketplace. Their comments are presented below.

Participants in this roundtable discussion include the following: Steve Harrison, product marketing manager at Carboline; Rodolfo Bayona, industrial coatings global R&D director with Dow Coating Solutions; David Lazzeri, business director for the Americas, DuPont Industrial Coating Solutions; Reggie Home, general manager of industrial coatings marketing at PPC Industries, Inc.; Eric Dumain, business manager for specialty resins at Reichhold; and Mark Thomas, director of marketing at Tremec Company.

JCT: What are the key issues facing the industrial coatings market today?

Steve Harrison, Carboline: Key issues affecting our marketplace are (in no particular order): Federal and state air quality regulations; raw material increases; global market influences (raw materials, foreign specifications, foreign steel prices, foreign test methods); applicator friendliness; and paperwork (air quality reports, data sheets, state reporting, etc.). In some markets the pressures are greater depending on whether it is shop-applied or field-applied coating projects. Industrial OEMs are under the shop regula-

Table 3—Special Purpose Coatings



Source: The ChemWest Group, Inc.

tion restrictions including HAPs compliance; whereas field painting is under not only Federal regulations but individual state regulations, with California being the toughest.

Mark Thomas, Tnemec: The key issues differ for development and production of industrial coatings. For development of new coatings, undoubtedly stricter regulation of VOCs is the key issue. Coatings formulators are challenged with developing compliant coatings that are still easy to apply and that perform as well as the products they are replacing. For production of coatings, the availability and steady supply of raw materials is the real challenge.

David Lazzeri, DuPont: High raw material and energy prices are of course an issue, and they are largely responsible for the current economic slowdown. Globalization and the rising demand for raw materials and energy are contributing to higher prices as well. It boils down to a supply and demand balance issue—prices are driven higher because of the overall low level of supplies globally. Regulations have moved from being a primary driver to having less impact compared to these raw material issues.

Eric Dumain, Reichhold: We see a mixed picture for industrial coatings. Segments related to the housing and construction downturn are down, while others, such as machinery and equipment, are strong due to global demand for raw material extraction (and the related necessary equipment).

Reggie Horne, PPG: Specific segments are affected differently by these many market factors. The coil and extrusion segment is experiencing difficulty because of the poor U.S. housing market. Many recreational markets, such as RVs, boats, etc., are being affected because of high gas prices. We are able to manage these issues because of the global nature of our organization.

Rodolfo Bayona, Dow: Innovation must also be mentioned as a critical issue for industrial coatings. Over the past 10 to 20 years, minor improvements through reformulations and incremental technological advances have been the norm. But there is a limit to where this approach can take the industry. Over the next few years, companies that can innovate and develop new building blocks will be the successful ones. Innovation is the only way to develop solutions with added value, and this strategy will be necessary for all industrial coating segments.

JCT: How have emerging markets affected this sector of the coatings industry?

Reggie Horne, PPG: Emerging markets have provided growth opportunity, especially for global companies, because it allows them to offset the soft U.S. market. PPG has positioned itself favorably by managing the migration of manufacturing from North America to these emerging regions with well established global facilities.

Eric Dumain, Reichhold: Emerging markets provide opportunities for a company such as Reichhold that has a broad product base. There will continue to be opportunities to serve emerging markets with established technologies.

Rodolfo Bayona, Dow: Western companies began by establishing a production presence in emerging markets a few years ago. Then they installed application development labs in order to modify existing formulations to incorporate local raw materials and to meet local needs. Today, R&D capabilities for true basic research and development work are being added with the goal of creating novel materials. Paint formulators taking this approach will need raw material suppliers to help support these efforts in order to maintain their growth in emerging markets.

David Lazzeri, DuPont: While emerging markets have provided growth opportunities, they have not provided the desired level of profit margins due to fierce competition in the industrial coatings market. Eventually we expect the market to settle out. In the Americas region, good growth areas for DuPont have included South and Central America and, to some extent, Mexico—plus Canada, where we previously did not have a well-established customer base.

JCT: How is the regulation of VOCs impacting the industrial coatings segment?

Mark Thomas, Tnemec: Meeting VOC limits for industrial maintenance coatings provides a challenge because the coatings intended for this use must exhibit exceptionally good performance in regards to corrosion, adhesion, color and gloss retention, and the like. This adds pressure to coatings manufacturers to maintain this high level of performance while meeting the new VOC regulations.

Rodolfo Bayona, Dow: In response to stricter VOC regulations, there is a big push to move away from solventborne systems. Waterborne and UV formulations are providing big growth opportunities. Even in China we see the government beginning to enforce regulations. Factories are thus putting pressure on paint formulators to develop alternative products, which provides opportunities for existing formulations and new technologies as well. Application technology must be considered as well.

David Lazzeri, DuPont: Regulatory requirements have driven the development of high solids systems, waterborne formulations, and powder coatings. Many producers are going beyond these requirements, though, to improve application productivity and achieve significant waste reduction. At DuPont specifically, regulations have spurred great innova-

tions that have been very successful in the marketplace. So we see continued regulation as a continued source of opportunity. One example would be the development of alternatives or substitutes for products withdrawn from the market due to the high cost of compliance with new regulatory programs such as REACH in Europe.

JCT: *What recent technology advances have taken place in this sector?*

Eric Dumain, Reichhold:

Innovation in waterborne coating performance, particularly in epoxy, acrylic, and urethane technologies, is allowing low-VOC, high performance alternatives to supplant conventional technologies.

David Lazzeri, DuPont: High solids, solventborne, and powder coatings formulations continue to receive attention. For certain applications, powder is the optimum in terms of transfer efficiency and solids level. We also expect that within a short time there will be a variety of products developed with special functionality—antimicrobial properties, for example—that are going to be important for specific segments.

Steve Harrison, Carboline: We see a lot of "exempt solvent" usage in existing formulations in order to comply with regulations. Polysiloxane technology has emerged and is gaining ground. Higher solids technologies (mainly epoxies) are being developed and used more and more. There is also a slow move to waterborne technology.

Reggie Horne, PPG: Technology advances have been a direct result of continuously seeking improvements across all aspects of the coatings process. These include: improvements in process workability; the push for sustainable resources and "green" products; functionality improvements including low cure, abrasion and corrosion resistance,

durability, and flexibility; and lowering overall applied costs.

JCT: *Is collaboration with customers important for industrial coatings? If so, why? And in what ways does it manifest itself?*

Rodolfo Bayona, Dow: In the past, raw material suppliers pushed product to formulators, who pushed product to customers. Today that dynamic is no longer applicable. Customers demand specific performance and in order to keep them satisfied, coatings formulations must understand what those needs are. The only way to do that is to collaborate throughout the supply chain, starting with universities and research institutes and including raw material suppliers, direct customers, and ultimate end users. Each member of the supply chain has an understanding of their own part and all need to work together to combine that knowledge in order to develop coatings that provide real value and meet all needs, from application to performance to cost.

Steve Harrison, Carboline: For the most part, industrial coatings are sold on a need-solution basis. Often a product or technology is developed with a specific customer (or customer base) in mind. It may have faster dry times, longer dry times, fewer coats, higher build, better weathering, faster recoat time, harder films, more flexible films, etc. Because these coatings are designed to provide specific solutions, collaboration with the end user is definitely a critical factor for success.

David Lazzeri, DuPont:

Collaboration with customers is in deed paramount, especially for addressing efficiency of use and cost management issues. Coatings producers need to develop products that fit specific customer processes and particular demands. The only way to ensure that the customer gets the best product possible—and

thus remains a customer—is to work closely together.

Eric Dumain, Reichhold: As is the case for the overall industry, customer consolidation demands close collaboration with customers, as the fewer, but larger, customers will have a bigger impact on technology trends. Closer customer collaboration manifests itself in more open supply chain relationships. With raw material cost/supply issues and globalization of product technologies and regulations, collaboration is key.

Mark Thomas, Tnemec: The frequency and severity of VOC regulation changes in some areas requires expeditious development of new coatings. To do this effectively, it is critical to obtain feedback on application from painting contractors and data related to performance from the owner.

Reggie Horne, PPG: Collaboration with customers is critical for success. Voice-of-the-Customer is crucial to understanding and anticipating customer needs to ensure we are working to develop products that meet those needs. This is particularly important in the industrial market. Industrial coatings customers have more individual and unique needs than other segments because their application and end-customers are so vast.

JCT: *What do you identify as the critical steps industrial coating suppliers should take to remain competitive in the current environment?*

Reggie Horne, PPG: To remain competitive, Voice-of-the-Customer and Research and Development are critical steps. You must be able to continuously stay ahead of new technologies and process developments. Other elements include aggressive actions from Purchasing to keep the price of raw materials down and optimize your internal quality processes.

Mark Thomas, Themed: It is imperative that coatings companies stay in close contact with raw material suppliers. They are continually producing new materials and if manufacturers aren't aware of the latest technologies, they'll be at a disadvantage. An unwavering commitment to research and development is also vital.

Eric Dumain, Reichhold: Coating suppliers have a tremendous opportunity to differentiate themselves by marketing their products' value-in-use and their commitment to sustainability through environment-friendly and worker-friendly products.

Rodolfo Bayona, Dow: Innovation is the most important strategy for success in the industrial coatings market given the business climate. Both raw material suppliers and paint formulators need to invest more in R&D. It is the only way to differentiate yourself from the competition. Otherwise you will be competing on price only.

Of course, in order to innovate, you must understand current and future market needs. At the end of the day, it doesn't matter what chemistry you use, but it is important that your technology meets the needs of the market. That means looking at the bigger picture and not focusing only on the chemistry, but also considering other issues such as surface characteristics, application technology, and performance criteria.

David Lazzeri, DuPont: Producers must have a clear and careful focus on targeted segments within the very large industrial coatings market. DuPont is very focused on certain areas that make good sense for the company and those on which we are sure we have the ability to deliver. Secondly, we agree that innovation within core segments and with key customers is absolutely imperative to help customers increase their competitiveness so they will be successful. Customer relationship activities, sustainability, cost management, and productivity are also important.

Steve Harrison, Carboline: Every company has to find its niche. It's difficult to be all things to all customers. It's hard to sell on price when your quantities (batches) are small (specialized product line) compared to the larger orders where you would make large batches (economies of scale). Developing a product line to fit your strategies, keeping raw materials (number and variety) to a minimum, getting a fair price for your product and service—these are all important.

Some companies sell on price, some on distribution, some on breadth of product line, some on the strength of their sales force (relationships), some on innovation, some on ease of use (constructability), and some on spec base—with variations of all the above. You have to decide what you can do well, build an organization around that, and fight to keep your competition out of your "space." Or, alternatively, build a better mousetrap and go take it away from someone else.

Roundup of Company Activities

Carboline Company specializes in the production of high performance coatings, linings, and fireproofing materials. Its OEM Engineered Finishes group serves only the OEM industry, providing very focused service and support, according to Harrison. Most of Carboline's coatings are based on high solids and solventless technologies and include zinc rich primers, epoxies, and polyurethanes as well as direct-to-metal formulations.

Dow Coating Solutions is developing a new platform of cycloaliphatic compounds with a cycloaliphatics diol already commercialized, new building blocks for polyester polyols, isocyanates, diamines, and many other monomers with applications in resin synthesis. The structure of these new compounds can be modified to make ingredients for a wide variety of coating types, according to Bayona. Their cycloaliphatic nature provides a unique balance of hardness and flexibility.

The company has also developed BlueWave Technology for dispersions that provides very careful particle size control and makes it possible to disperse many types of material in water (or solvent) that previously could not be used. As a result, many potential new opportunities for product development are now available to coating formulators.

New naturally derived polyols from Dow Coating Solutions are also being introduced to the coatings market. Renuva polyols are prepared largely from soy oils at the present time, but the company is developing the ability to manufacture them from a wide range of other seed oils.

For Bayona, one of the key advantages that Dow Coating Solutions has over the competition is access to the technologies developed in other Dow businesses. "We are now leveraging the knowledge and expertise gained throughout Dow and transferring technology

that can be applied in the development of coating solutions for our customers. One example is adhesion technology developed for polyolefin plastics that can be applied to solving adhesion issues for coatings," he states.

The company's commitment to R&D is underscored by some significant investments—a new R&D center in Shanghai and, in the future, another center in India. At the new China facility, Dow is investing heavily in high-throughput technology that will decrease evaluation time for formulations as the region moves from solvent-based coatings to waterborne. The company has already installed such capability in the U.S., and this additional large investment, according to Bayona, demonstrates Dow's commitment to the coatings industry and to speeding up new product development.

The industrial coatings product line from DuPont Industrial Coating Solutions includes Imron® polyurethane enamel, Corlar® epoxies, Tufcore® acrylics and alkyds, and Ganicin® zinc-rich coatings. The company's High Solids MasterTint® system, developed in response to the need for lower VOC products, provides improved application efficiency and reduced waste and has been widely adopted in the heavy duty truck and commercial vehicle segment. Other powder coating products include Alesta® for decorative purposes, Napgard® for oil and gas pipelines, and Cormax® electrocoat products that are HAPs and heavy metal free.

DuPont's goal is to achieve 30–40% of revenue through new product introductions. The combination of all of its liquid and powder offerings into one business unit has provided synergies, and the ability to offer a compre-

hensive portfolio to the marketplace has been very beneficial, according to Lazzari. The new product introduction goal was achieved in 2007.

PPG Industries manufactures industrial coatings for a wide variety of applications. In January 2008, the company acquired European-based SigmaKalon, expanding its global footprint. PPG is also building several new facilities in locations around the world, according to Horne. Duranar coatings from the company's coil and extrusion businesses have been "re-introduced" in celebration of the product line's 40th anniversary.

Reichhold has recently introduced three new products for the industrial coatings sector. EPOTUF® 37-685, an amine-functional dispersion for two-component, waterborne epoxy coatings, affords properties comparable to conventional solvent-based two-component (2K) epoxy coatings, according to Dumain, and is ideal for use in formulations for direct-to-metal applications. EPOTUF 608 is an oxirane functional resin designed for use in 2K non-isocyanate coatings and finds use in formulations designed for agricultural and construction equipment and aerospace and rail car coatings. A solvent-free, NMP free, anionically-stabilized, self-crosslinking waterborne polyurethane dispersion, UROTUF® F-100 is designed to give excellent toughness

(chemical and abrasion resistance) in woodfloor coatings.

Tnemec Company offers a wide range of industrial coatings including high performance acrylics, alkyds, epoxies, polyurethanes, and fluoropolymers. www.tnemec.com

