


POWDER COATINGS:

On the sidelines for the green-building revolution?

By Joe Maty, JAC Editor

The use of powder coatings for protective and decorative applications on high-profile architectural metal exteriors would logically figure to be an idea whose time has come, what with the heightened level of interest in green-building methods and materials.

Powder coatings, after all, contain no solvents, and thus emit no VOCs (volatile organic compounds) in manufacturing or application. Translation: Powder coatings don't adversely affect air quality. Factory-applied liquid coatings for architectural metal, on the other hand, by and large do contain VOCs, although the emissions are normally contained and eliminated with the use of high-tech environmental-control systems such as thermal oxidizers.



Color, cost, and competition keep the technology conspicuously absent from many high-profile exterior metal applications, despite eco-friendly image

But the case for powder coatings in the age of sustainable building falls short of a slam-dunk, it turns out. The green-building revolution started with powder coatings largely on the sidelines in the case of high-profile applications where

they otherwise would figure to be a logical “green” choice—notably, for exterior metal curtain-wall and panel systems.

The reasons why powder coatings remain outside looking in, to some extent, speak to the complex nature of materials selection in the real world of design and construction, where “green” credentials alone are no guarantee of mass popular appeal. Nor should they be, say advocates of specification criteria that rank quality and performance of materials as at least as high a priority as eco-correctness.

Manufacturers and users agree that the

Powder-coating finishes from Spraylat Corp. were applied to the woven aluminum mesh and frame supports on the exterior of these condominiums in Miami, FL. Photos courtesy of Spraylat Corp.

challenges confronting powder-coatings marketers include some very well established and highly regarded competition in the form of liquid-applied coatings that meet the toughest performance recommendations of the American Architectural Manufacturers Association (AAMA).

Then, there's the matter of color. Manufacturers of liquid coatings have mastered the art of mixing and matching colors, and doing it quickly—as in *today*. With powder coatings, color presents a more problematic endeavor due to the material's processing requirements. Making a sample for color evaluation essentially involves the entire production process—blending of formulation components, including color pigments; extrusion; chilling; processing into a flake material; and grinding into a powder. Then the powder must be electrostatically applied to a metal surface, where the color is analyzed. This regimen differs greatly from liquid coatings, where adding colors to a standard base formulation is relatively simple and speedy.

“It can take from one to eight ‘shots,’ or attempts, to hit the desired color dead-on,” says Steven Sternberger, PPG Industries Inc. Time is money, and matching a powder coating color to the specified sample does nothing to disprove this old axiom.

Essentially, cost, small-batch color requirements, and supply-chain issues

are working against powder coatings for the exterior curtain-wall and cladding market. On the other hand, powder's plusses include its environmental profile and the hardness and durability properties of the cured coating film, which make it highly useful for railings and other high-impact zones.

Dave Heflin, marketing director—SBU Americas, for Akzo Nobel Coatings' Interpon Powder Coatings Division, says he sees considerable interest in powder coatings for various types of architectural applications, due both to the technology's "green" appeal and the "robustness" of the cured-film properties of powder coatings. "There's interest and it's growing," Heflin says, adding that powder coatings can provide varied gloss levels and textures and can be applied as one-coat systems.

"We knew that to be successful, we would have to be responsive with custom colors and small-batch capabilities. We have those capabilities, with fast turnaround," Heflin says, pointing to the company's "Custom Color Fast Track Service"

program. Under the program, Akzo/Interpon Powder Coatings says it can supply custom-color matches for straight shades in two days and small-batch quantities (50-lb. minimum) in three days.

A key driver in the market, Sternberger says, will be interest on the part of coatings applicators. The task of selling architects and specifiers on the technology will evolve gradually, he predicts.

Sternberger was recently appointed to the new position of market development manager for powder coatings at PPG, a move that reflects the company's expectations for growth in the architectural segment. Other major suppliers of high-performance architectural coatings are also positioning themselves to expand powder's market share in the architectural segment. These companies, including The Valspar Corp., Akzo Nobel, Spraylat Corp., and Germany-based Tiger Coatings GmbH, say they are able to produce high-performance powder coatings for a range of architectural applications,



Superdurable polyester powder coatings were applied to exterior aluminum curtain-wall elements of the Mission Hospital in Mission Viejo, CA. Photo courtesy of Akzo Nobel/Interpon Powder Coatings

and will be happy to do so in a significant way—if and when demand for these products develops.

Powder coatings are produced by blending resins, pigments, additives, and other formulation components, then melting and extruding the mixture, cooling the extrudate, cutting it into chips (kibbling), and grinding this into a powder. The powder is applied to a metal part or surface electrostatically, then thermally

melted and cured, or baked, to a hard finish. The coatings were first introduced to the U.S. market in the late 1960s and early 1970s and have experienced rapid growth as finishes for the appliance, automotive, and general industrial markets.

It's different over there


Powder has long held a major market position in the architectural segment in Europe, but the circumstances are far different in the domestic market, say representatives of the major global coatings

manufacturers. The gulf separating the European and domestic markets can be attributed to geography, technology, and the disparate evolutionary history of the development, marketing, and specification of high-performance architectural coatings in the two economic spheres.

Chick

Newhouse, Valspar Corp. sales manager, extrusion coatings, says the polyester resin-based powder coatings that account for most of the market for interior and

exterior architectural applications in Europe have proven their mettle in the more northerly latitudes of the Continent, where climate—particularly the intensity of UV radiation—presents a less hostile environment for coatings than much of the U.S. These powder coatings, Newhouse says, would meet domestic guidelines as defined in the AAMA 2603 and AAMA 2604 voluntary performance-based specifications for



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coatings on aluminum extrusions and building panels. But AAMA 2605, the specification for superior-performing coatings on aluminum extrusions and panels, sets a higher bar for resistance properties, color and gloss retention, and erosion, as measured in the benchmark South Florida exposure, and that bar cur-



A polyester powder-coat finish from PPG Architectural Powder Coatings was applied to the aluminum windows in The Lenox, a stately residential development on Harlem's Lenox Avenue in New York. Photo courtesy Crystal Extrusion Systems

rently is met only with the use of high-performance coatings based on fluoropolymer resins.

Coatings manufacturers have been successful in developing powder versions of coatings based on fluoropolymers, but cost, color capabilities, supply issues, and the formidable position held by battle-tested, warranty-wielding liquid fluoropolymer coatings present a steep hill to climb.

Vanessa Ashman, marketing manager, Spraylat Corp., says her company is campaigning aggressively to convince architects, specifiers, and coaters that powder coatings based on 100% fluoropolymer resins can meet the demands of "monumental" and other high-end architectural applications. She says Spraylat's fluoropolymer-based powder coatings are experiencing widespread use in many

architectural applications and come with impressive warranties with approved applicators.

Ashman and other proponents of powder coatings also extol the technology's superior film properties, including cohesive strength that provides impact resistance and allows post-forming of architectural elements without marring or damage to the coated surface. Powder's suitability for architectural applications, assuming the correct resin system is specified for the given application, is not in question, submits Valspar's Newhouse. He says Valspar has invested hefty capital to develop high-performance powder coatings based on fluoropolymer resins. These coatings have performed extraordinarily well in South

Florida testing, he says.

It's green, but...

Emily Borland, an independent specifications consultant on the West Coast who worked for a number of years for architecture giant Skidmore, Owings and Merrill, says considerable interest in powder coatings exists at her former firm and among clients she has advised since starting her own business. But she says the issues of cost, product selection and availability, and the need for performance guarantees—warranties—have not been adequately addressed.

"If powder coatings become more readily available and cost competitive, I would advise consideration of powder," says Borland, who is based in San Francisco. From the standpoint of a "green" technology, she says powder

coatings present an intriguing proposition due to the absence of VOCs in the supply chain. With liquid coatings applied by the spray or coil process, VOC emissions can be contained and eliminated (that's green), but the solvents are still present in the coating formulation and must be dealt with by means of control mechanisms that in themselves require energy to operate (not so green).

"If you can simply eliminate the VOCs at the source, that has to be a better process than gathering and destroying the VOCs," Borland says. "If you could eliminate even those VOCs from being produced, that would be all the better.

"Generally, I am very positive about powder coatings, and I am interested in where the industry is looking to go with them," Borland says. But currently, she does not see powder as a viable alternative for the types of high-profile architectural applications that account for most of her work. "Certainly, I am willing to make it happen when I know they are available,



Powder coatings based on fluoropolymer resins were applied to exterior window and door extrusions of this high-rise condominium building in San Diego. Photo courtesy of Akzo Nobel/Interpon Powder Coatings

are cost effective, and it are backed up with the needed warranties," she says.

Borland, who says as much as 85% of her specification writing involves sustainability goals, says more work is needed—both on the coatings-supply side and in green-building programs such as LEED—if powder coatings are to realize their potential. Currently, the LEED rating system does not specifically include credits for the use of powder coatings, although architects can seek "innovation" points for the use of low-VOC exterior coatings.

Gordon H. Smith, an exterior curtain-wall consultant based in New York, expresses a similar opinion about powder coatings. "At the moment there is insufficient information for us to be able to verify the long-term suitability in terms of weatherability—fade resistance, long-

term film integrity, and so on—of the finishes that are normally accepted here," says Smith, president of Gordon H. Smith, P.E.

"Long-term weathering data is not available," Smith adds. "When we have asked about warranty, there seems to be a little waffling on that."

Smith says that while powder coatings suppliers extol the technology's green attributes, performance capabilities are what matter at the end of the day. "We constantly hear that it's green to use powder. But if it only lasts half as long, then there's no sense in using it. It boils down to a performance demonstration first," he says. "We would be very interested if powder would become available in the United States, but we have been unable to get the information we need to give it serious consideration."

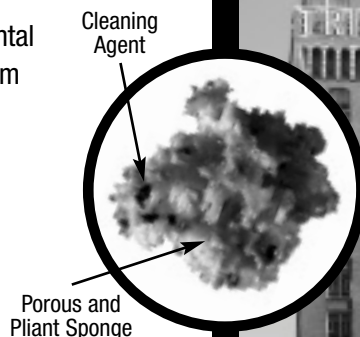
PPG's Sternberger concedes that significant growth for the use of powder coatings for high-end exterior curtain-wall and metal-cladding applications "will require suppliers to take a leadership role, with chemistry, market focus, and demonstration of product performance." This, in turn, will reduce the risk on the part of specifiers and architects leery of products that are less well known.

Addressing the issue of custom color capabilities, Sternberger says architects are fond of the bright metallics that liquid-applied coatings can deliver, in color-coat formulations containing metallic flake that are usually topped with a clearcoat for protection. In powders, mica, a mineral, is typically used to generate the metallic look, and this "gives a good aesthetic but not identical to the bright, shiny, silver metallics," he says.

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The reality in design is that the process is always behind schedule and color is one of the last decisions made with a project, Newhouse says. Most curtain-wall projects in the U.S. are custom colored, and color matching must keep pace when the race against the project timetable is on.

In Europe, by contrast, the design and building professions follow the lead set by the RAL color system, a more standardized approach to color choices. Such an approach would be difficult to adapt to the U.S., however, due to the cost of keeping adequate inventories of the much more pricey fluoropolymer powder coatings that are specified for demanding architectural exposures. Fluoropolymer powder coatings cost somewhere between \$20 to \$35 per pound, as opposed to \$4 to \$7 for polyester-based

powders, industry sources say.

"We would have to import the European business model" and its more standardized approach to color selection, Newhouse says. "But the American architect is a fan of custom color."

Other opportunities seen as promising

Valspar's Newhouse says powder-coatings manufacturers have developed excellent polyester and superdurable polyester coatings products for standard residential and commercial window systems—applications that are a good fit with powder technology's current limitations as dictated by economics and technical feasibility.

"The curtain-wall niche aside, there is strong opportunity for mid-grade, standard colors for extrusions for residential doors and windows, commercial win-

dows, boat docks, a host of other markets. Here, color range and customization is less crucial.

"We're bullish on powder for the residential side of the market," Newhouse says. "For the high-end curtain wall market, there are barriers."

PPG's Sternberger agrees, saying powder coatings will experience significant growth in applications meeting the AAMA 2603 and 2604 standards, where competitive economics and the strong film properties of powder will work to complement the technology's eco-friendly profile. For applications meeting the specifications of the more stringent AAMA 2605, liquid will retain a prominent place, he says, with powder making some inroads due primarily to its environmental credentials.

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