

The Benefits of Prepainted Steel in the Overhead Door Industry

For several decades, the use of prepainted steel has been embraced by a number of industries from industrial to automotive. Not only can prepainting steel be a branding opportunity, it can transform everyday objects into eye-catching products. A multitude of colors, textures and patterns can be added to manufactured goods such as appliances, building components, agriculture equipment and even office furniture.

In the overhead door market, prepainted steel enables manufacturers and dealers to offer their customers more color and design choices and an overall better product. It provides a uniform, edge-to-edge coverage of pretreatment, primer and finish coats. This process ensures superior paint adhesion, color consistency and paint flow, and more corrosion-resistance over a postpainted product.

In this report, PDD examines the prepainting process from pretreatment to painting, along with the various benefits of the process and end product for manufacturers, dealers, consumers and the environment.

By Amy Campbell

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Considered modern and innovative, prepainted steel has been embraced by dozens of industries looking for ways to elevate their products to new levels of sophistication. With an open-ended palette of color choices and unlimited style options, along with durability and sustainability, prepainted steel has become a go-to product.

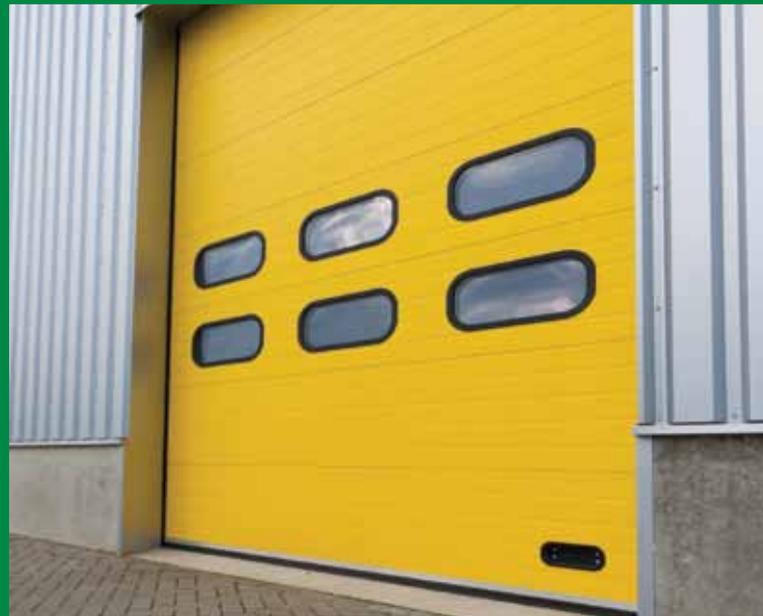
In the overhead door industry, where consumer demand is a constant drive toward a better-quality product, prepainted steel has enabled manufacturers and dealers to offer a unique, sustainable and durable product. The prepainting process provides edge-to-edge coverage of pretreatment, primer and finish coats, ensuring superior paint adhesion, color consistency and corrosion-resistant doors.

PDD takes an in-depth look at the prepainting process, why prepainting is preferred to field painting, and how manufacturers, dealers, consumers and the environment all can benefit.

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By Amy Campbell

The vanilla-white garage door has been a staple in American suburbs since the 1950s. Over the years, it has undergone a number of transformations, including morphing from a single upward-acting unit to a door with individual sections and even windows. Technology has also played its role in the overhead door's evolution, with the use of garage door openers and remotes, an automatic-reversing system, and various accessories including keychain remotes and wireless keypads.

In the commercial realm, durability has played a significant role in the progression of overhead door products. As commercial and industrial manufacturing plants, distribution centers and warehouses streamline operations to meet federal, state and industry standards, the need for quality, durable and long-lasting commercial and industrial doors has grown.

One huge step to creating products that meet all the needs and requirements in the overhead door market was the shift from postpainting doors in the



This picture shows the painted coil being rewound after slitting. Slitting is an off line process (separate from the coil coating process) in which a coil of material (master coil) is cut down into a number of narrower width coils. *Photo courtesy of Metal Coaters.*

field to prepainting the metal in the flat form before fabrication into the finished product. The process, called coil coating, is vastly different from that of postpainting doors with a spray-paint system or powder coating, both of which are still used in the overhead door industry.

“For the past 35 years or so, sectional garage doors, slat doors and corrugated

sheet roll-up doors have all benefited from the use of prepainted steel,” says Dan Happel, regional sales manager for Metal Coaters, which coil coats steel and aluminum coil for the construction market. The company cleans, pretreats and roll applies organic coatings in a continuous process on hot-dipped galvanized, Galvalume, cold-rolled, electro-galvanized and aluminum coil.

Prepainted steel offers numerous benefits for overhead door manufacturers, door dealers, consumers and even the environment. “Essentially, coil coating or prepainted steel offers a superior product vs. postpaint applications,” Happel points out. One of the biggest benefits to prepainted steel is the uniform, edge-to-edge coverage of pretreatment, primer and finish coats. This process provides superior paint adhesion, color consistency and paint flow, and corrosion-resistance over a postpainted product.

For decades, the use of prepainted metal has been embraced by a number of industries. Not only can it be a branding opportunity, it transforms everyday objects into eye-catching products. A multitude of colors, textures and patterns can be added to manufactured goods such as appliances, building components, agriculture equipment and even office furniture.

In the overhead door industry, prepainting steel takes the plain-vanilla overhead door to the next level of sophistication—just as adding individual sections and automatic operators once did. And much like those changes, the revolution is consumer-driven. Never before has there been more change in the overhead door in terms of design, sustainability and durability than in the

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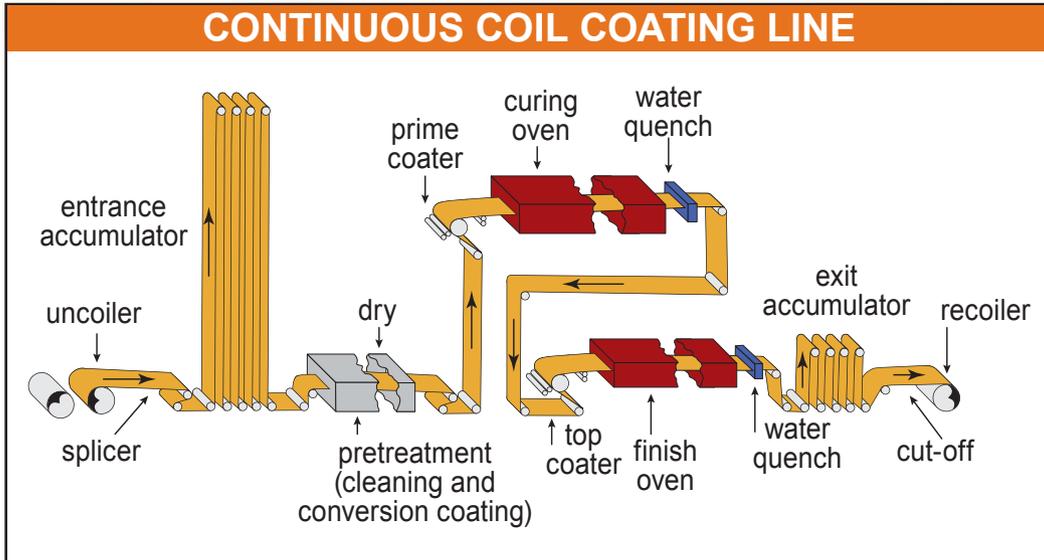
Primers

- **Primers** are applied before the finish coat to aid in the paint systems adhesion to the substrate, add additional corrosion-resistance properties through the use of corrosion-resistant pigmentation and to improve the paint system's flexibility.

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past decade. "Aesthetically, prepainting looks a lot better than any kind of after-market paint," says Jimmy French, president of Asta Door Corp., an Acworth, Ga.-based commercial door manufacturer. "If you send a door out and they field paint it, it never looks quite as good as prepainting. [Prepainted steel] has a smooth finish, and we certainly couldn't run it through our mills in any other form."

Regardless of whether it's a commercial, industrial or residential application, consumers today are demanding better-quality doors that come in more colors and design options. Overhead door manufacturers have responded, introducing a myriad of styles, color and pattern choices, increased durability, and even sustainability features. "Dealers benefit from prepainted garage doors because the product finish is of a high quality, durability and consistency, resulting in minimal consumer finish issues and happier consumers," says Delbert Philipot, vice president of cost, quality and engineering for Amarr Garage Doors, a Winston-Salem, N.C.-based manufacturer of overhead doors.



Information provided by Metal Coaters.

The Coil Coating Process

Coil coating, or the manufacturing of prepainted metal, involves a number of steps, the first of which is a general inspection of the metal. The coil coater unwinds the coil and look for defects in the metal. The next step is to clean and pretreat the metal in preparation for the two-coat paint process, which consists of primer and finish coatings. Each coil coating manufacturer has its own system but, in general, the metal strip travels through a multi-stage cleaning and rinsing system to remove mill oils and contaminants.

Next the coil coater applies a conversion coating or pretreatment to aid adhesion of the coating to the metal and corrosion-resistance. The metal is then coated or painted. "Most coil coating lines today are tandem paint lines, where two coats of paint can be applied to each side of the sheet in one pass through the paint line," Happel says.

After the coatings have been roll applied to the metal, the coil strip enters an oven in which the coatings are cured at temperatures that exceed 400 degrees, providing "a baked enamel-like finish that has excellent chalk- and fade-resistance characteristics," Happel says. "This results in a finish that's hard, and scratch- and stain-resistant."



Photo courtesy of Metal Coaters.

A typical coil coating line can produce approximately 2 million pounds of sectional overhead door stock in a 24-hour period. "The precision roll-coating method applies extremely controlled and uniform thicknesses of pretreatment,

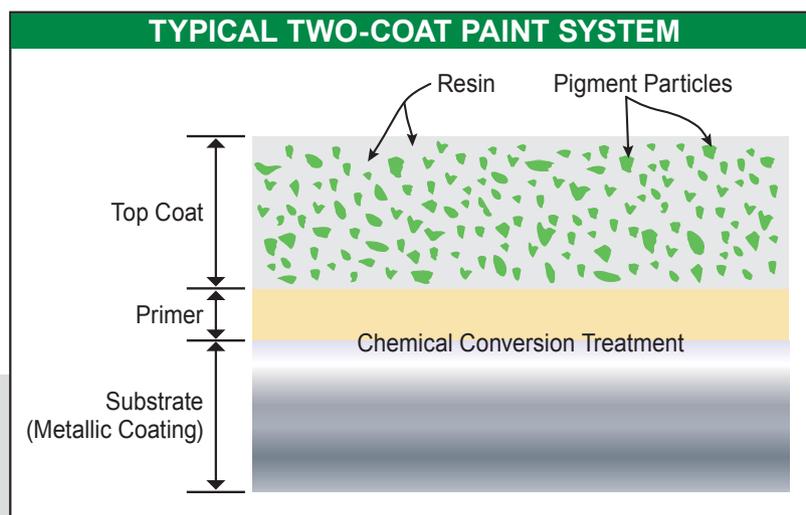
On average, coil coaters can prepaint 500 feet of steel per minute. This is a huge increase over postpainting, which averages about 30 feet per minute.

primer and a top coat on the flat metal sheet, from edge to edge," Happel says. The extensive cleaning and pretreatment process ensures superior paint adhesion. In addition, coil coating "typically provides advanced corrosion-resistance when compared to postpainted products," Happel adds.

Coil coaters can also adjust the paint thickness to meet individual customer specifications, offer laminate films, and print patterns and unique embossing patterns. This is a great benefit for overhead door manufacturers looking to add texture, designs and distinctive embossed patterns to overhead door products. "The use of prepainted metal and postembossing has proven to be superior to postpainted applications from both an aesthetic and durability performance perspective," says Gary D. Nesbit, business development manager for Metal Coaters. "When postpainting an embossed pattern using a power or spray method, it's difficult to apply a consistent film thickness and coverage over an embossed door panel."

This can lead to applications of excessive paint film, which wash out the pattern's depth appearance and adversely affect the aesthetic appearance of the finished product. Adding paint film also adds cost to the product. "With

Top-Coat Cross-Sectional View



Most popular architectural paint finishes are two-coat systems.
Courtesy of Metal Roof Advisory Group Ltd.

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pre-painted steel, the embossing process is performed after painting to avoid these issues,” Nesbit says.

In the overhead door industry, there are typically two types of paints used during coil coating, polyester or silicone modified polyester. Polyesters are generally used for sectional garage doors, slat roll-up doors and corrugated sheet roll-up doors. Super durable polyesters and silicone modified polyesters are commonly used for corrugated sheet roll-up doors.

Most coil coaters also have the capability to slit the product after painting to the finished width specified by the overhead door manufacturer. The metal coil is then delivered to the manufacturer, where it’s processed through the company’s roll forming mills and turned into doors. “It’s a fairly smooth process. If there are any holdups, it could be the paint supplier got behind or steel lead times are drawn out because the market has tightened up a bit,” French says.

Cleaning and Pretreatments

- **Alkaline cleaners, mechanical brushes and fresh water rinses** are used to prepare metal strip surface for the **pretreatment** process by removing surface contaminants and mill oils applied to prevent corrosion during transit and storage. Successful cleaning of the strip depends upon the optimization of control of dwell time, bath temperature and chemical concentration.
- **Pretreatments or conversion coatings** are chemical treatments applied to the metal strip after cleaning and prior to painting. They are designed to improve the surface reactivity of the metal substrate, promote paint adhesion and provide corrosion resistance.
- **Pretreatments** are applied by either an immersion process (dip/squeegee) or they are roll applied (dried in place). Roll applied **pretreatments** are immediately flash dried in a compact infrared oven. Dried in place **pretreatments** are more environmentally friendly as they have no effluents or liquid waste.

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Adding Color and Style

One of the biggest draws to prepainted steel is the ability to create overhead door products in more colors and varying styles. Historically, manufacturers of overhead doors have been limited when it came to color choices. Hues included white, tan, brown and sometimes gray. "Now you've got five shades of green and five shades of red. Black is even offered," French says. Asta Door, for instance, offers 14 standard sheet door colors.

Canadian overhead door manufacturer Garaga is one company that offers black, along with five other colors for its line of steel doors, and 10 colors in its aluminum line. "We talk to Canadian window manufacturers and dealers and ask about color trends," says J-F Morin, special advisor to the marketing department for Garaga. Earth colors such as claystone, dark sand and black are currently trending in the Canadian residential garage door market, Morin notes.

Like Garaga, other overhead door manufacturers have expanded their color options in response to consumer demand. "Clopay continues to update its portfolio of prepainted steel color offerings to meet current exterior trends," says Pat Lohse, vice president of residential marketing for Clopay Building Products, a Mason, Ohio-based manufacturer of overhead doors. "In recent years, we have added colors like Desert Tan, Sandtone, Bronze and a broader range of ultra-grain shades to complement other stained exterior wood products like shutters, entry doors, porch railings, columns, windows, etc."

Amarr Garage Doors has also increased its palette of prepainted colors. The company currently offers 10 choices in its residential steel collection, allowing consumers more selection. "More prepainted colors are offered in the garage door industry today than ever before," Phlipot says.

This broader spectrum of colors enables door dealers to meet their customers' demands and be more competitive in their markets. "We have the ability to offer colors that are maybe not in our standard color selection, but if the job is large enough to warrant [coil coating] 20 or 40 tons of



Photo courtesy of Overhead Door Corp.

Consumers are
demanding
better quality
doors that come
in more colors
and design
options.



Prepainted steel enables homeowners to match the color of their garage door with other exterior elements of the their home. *Photo courtesy of Metal Coaters.*

steel in that specific color for a job, we can offer it. That's very attractive to end users," French says.

In the residential market, the introduction of the carriage house door has spurred an abundance of new styles that are vastly different from the traditional rectangle or square found on garage doors over the past few decades. With the ability to add embossments and textures, manufacturers can create unique styles, giving homeowners a variety of finish options that can even match other exterior elements of

their home such as the front door, shutters or trim. This allows homeowners, architects and builders to move from the "cookie-cutter" approach in favor of adding curb appeal and individuality to each home. "[Homeowners] want something different from their neighbors," Morin says.

Several overhead door manufacturers also offer paint finishes that simulate the appearance of stained wood on a steel door. The distinctive product enables homeowners to have a garage door that looks like real wood without the maintenance. "The baked-on primer and paint finish is extremely durable and requires no special maintenance," Lohse says.

Finish Coats and Backers

Finish coats or top coats are applied after the prime coat to provide:

- The desired physical appearance or aesthetics
- Weathering characteristics: chalk-, fade- and gloss-retention
- Physical properties: hardness and flexibility

Backers are applied after the prime coat to provide:

- Additional corrosion protection
- Finish coat transit abrasion protection
- A consistent bottom side appearance

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Sustainability Factors

Once just a buzzword, sustainability is now an important—and obtainable—goal of just about every business, including overhead door dealers and manufacturers. Consumer demand is driving this trend also, compelling companies to create more eco-friendly processes and products. In fact, a 2011 survey from the National Home Builders Association showed 68 percent of home builders expect homes in 2015 to have more green features and technology—including garage doors and operators.

Prepainted steel fits in naturally with the overhead door industry's sustainability mission. First, because the cleaning, treating, priming and painting are done on a large scale by coil coating manufacturers, it's a more energy-efficient process.

The overhead door industry and the environment also benefit from the coil coating process through these key aspects:

- Substantial energy savings vs. postpainting
- Trouble-free environmental compliance
- Minimized waste and emissions
- 100 percent transfer efficiency of the coatings
- A closed-loop process that allows for the efficient capturing of solvents and incineration-heat recovery

Coil coaters have continually improved their process over the years to not only raise the quality of the material, but to lower environmental impact. The National Coil Coating Association reports the industry has added these innovations:

No-rinse pretreatments. Many coil coating lines have been able to dramatically reduce water usage using this innovative technique.

Curing ovens. There have been major improvements to the most energy-intensive part of the coil coating process, now curing paint in seconds, using traditional gas-fired techniques, innovative induction, infrared and near-infrared curing.

Elimination of volatile organic compounds (VOCs). The coil coating process collects VOCs from solvents in paints and destroys more than 99 percent without polluting the atmosphere.

Another sustainability benefit is the quality of today's paints. Paint suppliers to the coil coating industry provide coating formulations that offer weathering

The coil coating process collects VOCs from solvents in paints and destroys more than 99 percent without polluting the atmosphere.



This painted coil with a black base coat and a white "stripe" finish coat is exiting the finish ovens and threading through the exit end accumulator tower. The tower serves as a reservoir of material so when the paint line is temporarily stopped to pull a finished coil off the rewind mandrel, it can continue to run at a constant rate of speed.

Photo courtesy of Metal Coaters.

characteristics including chalk-, fade- and gloss-resistance, and corrosion and abrasion protection.

"The quality of the paint itself has improved, so you can even reduce the thickness required and still get the same warranties and performance over the long term as when you had to put a much thicker coat on," French says. "It's a real durable finish. We never have any adhesions problems, chalking, fading or cracking."

Naturally, a higher-quality door equates to a longer product life in commercial and residential applications. "The finish is guaranteed to protect the surface of the door from elements that would cause premature wear and tear and lead to a shorter door life, thereby reducing material and commodity costs for replacement," Lohse says.

Challenges to Postpainting or Field Painting

Despite the abundance of color and pattern choices in coil coating, there are still instances of overhead doors being painted in the field—whether in a door dealer’s own paint shop or outsourced to a painting company. In some cases, overhead doors are even being painted after installation by a homeowner.

While many door manufacturers and dealers can offer home or business owners step-by-step instructions on painting their doors, most advise against it. “The main drawback of jobsite painting is surface preparation,” Philipot says. The painter—whether the door dealer, homeowner or a professional—needs to make sure the surface is clean so good adhesion of the primer and top coat takes place. “The other issue you face is making sure the paint coat is applied uniformly to produce color and gloss consistency throughout the product,” Philipot says. This is a non-issue with coil coated overhead door products.

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Not only would the painter need to be careful during preparation for field painting, the longevity and durability of the door will ultimately suffer. “When you field paint, you’re going to have to field paint it again. Prepainting is going to last a lot longer,” French says.

How the finish on a door fares over the years also depends on the pigment of the paint. “There are pigments that do not weather well. They cannot resist the ultraviolet exposure. They tend to fade much quicker,” says Ed Lundy, manufacturing supervisor, rolling steel powder coat division for Overhead Door Corp., a Lewisville, Texas-based manufacturer of overhead doors and openers. These hues include reds, yellows and oranges, while grays, browns, dark greens and shades of white keep their luster longer.

Dealers who do have their own paint shop need to take several precautions, including having a clean, well-ventilated area large enough to accommodate the garage door sections, plus cover the costs associated with the paint and labor, Lohse notes.

Steel doors can be painted with a high-quality exterior latex paint. “Customers who plan to paint their door often just order white or a factory-finished shade closest to the paint color they plan to use,” Lohse says. “Most dealers will advise customers to hire a reputable painter to finish the door before it’s installed.”

Regardless of color or paint type, all doors can be damaged. “Any finish can be marred or scratched. If you abuse it, you can damage it,” Lundy points out. However, there are some steps to keep overhead doors well-maintained. Lundy suggests washing them as you would a car, then applying a thin coat of wax. “Don’t use chemicals or abrasives on the finish,” he says. It’s up to door

dealers to educate their customers about warranties, maintenance and things that could affect the door's finish.

While some believe field painting lowers the price of the door, it's actually just the opposite. In most cases, coil coated or prepainted steel has proven to be more economical than postpaint, Nesbit says. In addition, manufacturers and dealers can reclaim valuable plant floor space for manufacturing and storage rather than a postpaint operation. Nesbit also notes these economic advantages to coil coating:

- Less work-in-process inventory
- Reduced production lead times
- Reduced environmental permitting cost
- Elimination of hazardous waste disposal costs associated with paint-finishing operations
- Elimination of costly die lubes
- Elimination of capital expenditures associated with operating in-house paint lines

"With the increased lifetime of the prepainted surface, the consumer saves money associated with the expense of refinishing a door," Nesbit says. Another area to use caution is voiding any door warranties. "In most cases, once a door has been refinished by the consumer, the paint-finish warranty from the door manufacturer is void," Nesbit says.



This is how the finished painted coil appears after it has been removed from the paint line's rewind mandrel before packaging. *Photo courtesy of Metal Coaters.*



Photo courtesy of Overhead Door Corp.

Meeting the Demand

With the availability of more colors and styles in today's overhead door products, dealers are now able to meet their customers' requests through prepainted overhead door products. "The door arrives prefinished and ready to install," Lohse says. Colors will also be consistent with the customer's expectations based on the sample swatch reviewed when the door was ordered.

In addition, all door components including window frames and inserts, grip inserts and stop molding can even be color-matched to the prepainted steel color. "All in all, as far as the durability and longevity of prepainted steel, it's the only way to go," French says.

In the residential market, the introduction of the carriage house door has spurred an abundance of new styles that are vastly different from the traditional rectangle or square found on garage doors over the past few decades.

Ultimately, superior products equal increased customer satisfaction. This, in turn, leads to more sales opportunities and bigger profitability for dealers and manufacturers. "Today, prepainted steel's use has gone beyond the use on traditional sectional garage doors, slat doors and corrugated sheet roll-up doors and has allowed door manufacturers to offer new styles and products like carriage house doors," Happel says. "Prepainted steel and its benefits are only limited by our imaginations. What's the next opportunity for the use of prepainted steel in the overhead door industry?"

Paint 101

By Rob Haddock and Dan Happel

In liquid form, coil coatings or paint are comprised of three principal ingredients: resin, pigment and solvent. Resin is the backbone of the coil coating, binding it to the substrate and providing physical properties and weathering characteristics that are desirable in an overhead door coating. The pigment's purpose is to provide the desired aesthetics or color.

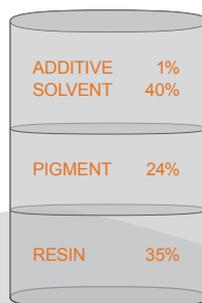
Because pigment and resin materials are solids, they must be dispersed by blending with a solvent. The results are coatings that can be applied to the metal strip in the coil coating process. (Solvents are not necessary for powder coatings, but the overhead door industry has predominantly used the liquid coating-delivery systems associated with the coil coating process for the past 30-plus years.)

The solvent is the vehicle by which the solids (resin and pigment) are transported to the metal surface and allows the coating to flow and level out without the orange-peel finish that's often associated with postpainted product. Liquid coatings become dry films after the coating's solvents are baked out during the curing process in the coil coating line. The resin then becomes a monolithic film that acts as the "glue," holding the pigment particles to the substrate for years to come, surrounding and protecting them from environmental degradation.

Rob Haddock is the director of the Metal Roof Advisory Group Ltd., a consulting firm performing a variety of services for a worldwide clientele. He's a well-known metal roof consultant, author, speaker and inventor, and has authored a number of training and educational curricula for various trade groups.

Dan Happel is the regional sales manager for Metal Coaters, which coil coats steel and aluminum coil for the construction market. The company cleans, pretreats and roll applies organic coatings in a continuous process on hot-dipped galvanized, Galvalume, cold-rolled, electro-galvanized and aluminum coil.

Components of Paint



Viscosity and
Surface Properties

Color

Backbone of Paint

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