

Case Study



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UV Powder on MDF

Decorative Veneer brought innovation to the industry when it began using decorative vinyl films. Now it's bringing innovation to the industry again with UV powder coating . . .

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During the 1970s, 3M designed and created a vacuum-form machine to apply reflective vinyl film to road signs as a means to protect them from weather and debris. Maynard Snow, a Kalamazoo, MI, entrepreneur, purchased one of the machines and modified it to apply decorative vinyl film on furniture components.

Thirty years later, the company he founded, Decorative Veneer, is recognized throughout the U.S. as a premier supplier of quality decorative veneer panels and components to manufacturers of display fixtures and office, home and health care furniture.

While most companies would be satisfied with one such success story, Decorative Veneer is betting that lightning can strike twice. Only this time, the company's president, Michael Knoblauch, is working with leading industry material and equipment suppliers to adopt UV powder coating technology as an



alternative to vinyl film.

Though the demand for powder coating has nearly tripled during the past decade, increasing from 140 to 350 million lb/yr, until recently, applications on wood substrates, such as Decorative

Veneer's medium-density fiberboard (MDF) materials, have been virtually nonexistent. However, with the development of low temperature and UV-cured powder coatings, the timing from Decorative Veneer's perspective is ideal.

Necessity is the Mother of Invention

Throughout the past three decades, Decorative Veneer has developed an expansive but defined product line around the process of vacuum-forming vinyl on MDF to make finished components that become part of a furniture system for office, health care, consumer electronics and home furniture. "The vinyl process is a viable process for these market applications," said Mr. Knoblauch. "We can three-dimensionally finish a part, incorporating design elements that cannot be achieved in different processes. We can achieve radius corners, edges and recesses with a homogeneous finish and essentially no seams. Whereas a high-pressure laminate finish cannot accomplish

the results, we're able to form the vinyl over the substrate."

However, as the barrier to entry into the market has decreased in recent years, Decorative Veneer found itself facing an onslaught of new competitors. "After 30 years, we began looking for new ways to grow the business, preferably in an environment that is process manufacturing versus batch manufacturing oriented. Following a lengthy investigation, the process we believe has the greatest potential for us is UV powder coating, partly because it allows us to use our existing customers or distribution channels, but also because the powder, application and curing systems have already proven themselves in other substrate finishing applications," stated Mr. Knoblauch.

The Operation

The company began calling on its customers in September 2000 to introduce them to the powder on wood concept, demonstrate how the application works and describe the benefits of the new product. "Based on test results obtained at Nordson's powder coating testing facilities, we were able to show finished product samples to our customers," explained Mr. Knoblauch. "Without exception, they were absolutely positive about the potential of UV powder on wood."

Wasting no time, Decorative Veneer broke ground in October 2000 for a powder coating operation at its Plainwell, MI, facility. Powder coating equipment from Nordson Corp. and UV/IR ovens



from Nutro Corp. were shipped in February 2001; testing in the new 40,000-ft² facility began in March and April, 2001.

The operation is situated in a 10,000-ft² temperature-controlled powder coating room that currently houses a single powder coating booth and several hoppers to handle quick color changes. The room is designed to eventually accept a second booth that will accommodate even more and faster color-change requirements.

The Application System

The UV powder coating system can finish parts up to 97 inches long, 60 inches wide and 0.35 inch to more than 2 inches thick. Parts are manually hung on an overhead conveyor that travels only a short distance at 7.5-15 ft/min before entering a single low-temperature (75-200F) convection oven that preheats the MDF.

Following the preheat process, parts pass through an Excel 2000[®] powder coating booth equipped with opposing racks of seven Versa-Spray[®] II guns on reciprocators. A single Sure Coat[®] manual spray gun is also available at the front and back end of the booth to reach deep recesses. Coating thickness ranges from 1.8-3.5 mils. The booth also features a Sure Coat[®] application controller and several hoppers to accommodate quick color changes.

Coated parts then pass through a second IR/convection oven to gel the powder and through a UV oven to cure the powder. Once finished, the parts are inspected, packed and shipped to customers.

Powder Coating on Wood Trends

Ongoing research and development of lower temperature, UV-curable powder coating materials demonstrates the viability and tangible features and benefits of this market. The result is steady growth of powder on wood applications.

According to a recent report by The Freedonia Group, demand for powder coatings in the U.S. alone is forecast to increase to 505 million lb in 2005 (from 140 million lb in 1990), due in great part to "suppliers rapidly expanding the functional range of powders into wood and plastics, which is opening new applications for these coatings."

Mike Stuhldreher, market development manager at DuPont, supports the industry assessment and projections. "We're very bullish about the prospects of UV powder on wood, to the point that we are focusing exclusively on UV powders for the MDF and wood markets at the expense of thermoset," says Mr. Stuhldreher. "Ultimately, we believe the fundamental benefits of UV powder – lower temperatures, faster line speeds and thinner film thicknesses – are the three major reasons why UV technology will be the way the industry goes." In fact, DuPont considers the MDF and HDF markets to be only the beginning of where UV powder will lead.

Floyd Roberts, UV marketing manager of Govesan, agrees, "Every day we're developing and testing new resin products that make it possible for finishers like Decorative Veneer to apply a complete palette of colors and achieve a wide range of finishes on both engineered and solid wood as well as other heat-sensitive substrates."

As with applications on metal, the powder used in the wood process is a mixture of finely ground

particles of pigment and resin that are sprayed onto a vertical or horizontal surface. The powder particles are then heated in an infrared/ultraviolet (IR/UV) oven that permanently fuses them to the surface, creating a finish that is both durable and attractive. New applications include office furniture, retail display systems and a wide range of home and office cabinetry.

Mike Riley, powder systems specialist at Nordson, says that powder suppliers deserve a great deal of the credit for pushing powder chemistry to new extremes. "Lower curing temperatures have made UV powder coatings suitable for heat-sensitive substrates like MDF, which only several years ago would have been impossible. As a result, an entire new segment of the industry is now growing and expanding."

Steven Couzens, wood industry specialists with H.B. Fuller, says that it is now possible to meet a wide range of specifications with UV powder. "We've already produced 10 standard UV colors for Decorative Veneer," states Mr. Couzens. "If the company gets a request for a black or tan 20-gloss texture, it's available right now. Beyond these standard colors, we're also able to match particular colors or patterns from a part that was previously coated with a high pressure laminate, vinyl or even liquid."

Regarding the growth potential of UV powder on wood, Mr. Couzens is very optimistic. "The amount of MDF used in the U.S. today is astronomical," says Mr. Couzens. "In fact, if only 25% makes its way into powder within the next five years it will be sufficient to justify the amount of research dollars that the industry at large has put into the development of the technology."

Becoming an Industry Technology Leader

"We can now produce the same type of component with some of the inherent qualities of what we're able to produce on our vinyl and in some cases improve on it," proclaimed Mr. Knoblauch. "And we can produce them in a process-manufacturing environment; that's the logic behind the purchase of the powder system. With the UV powder system, Decorative Veneer has also positioned itself on the front end of the marketing curve — having something that no one else has yet in an environment that has a pretty high barrier to entry. If you don't have the distribution to fill the capacity, we see that as a barrier to entry. We believe we can fill up the distribution channel fairly quickly."



Powder on wood results in an attractive, durable finish that can outperform traditional wet and laminate finishes and greatly increases product design flexibility.

Benefits/Advantages

UV powder coating on MDF offers numerous benefits, including: availability of a broad palette of colors, textures and glosses; thinner finish thickness (2-3 mils vs. 8-10 mils); use of standard MDF; nondestructive low-temperature preheating and flow coating; faster cycle times; and an environmentally friendly process (no VOCs or HAPs).

"DV's powder coating and UV-curing process eliminates costly and time-consuming priming and prepping. Unlike common systems, premium grade MDF is not required, nor are high-temperature preheats and flow coats that can damage the substrate," stated Mr. Knoblauch. "The result is an attractive, durable finish that outperforms traditional wet and laminate finish processes and greatly increases product design flexibility. The process will revolutionize the wood finishing industry." **PF**

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