

POWDER ON WOOD

How to identify a quality powder coated MDF finish

Craig Martin *BTD Wood Powder Coating*

The last edition of this column highlighted six common misconceptions of powder coated medium density fiberboard (MDF). One of the misconceptions revealed the fact that powder coated MDF finishes are not all the same. The truth is that the quality of finish varies across manufacturers and can be manifested visually or beneath the surface. A quality powder coated MDF finish is beautiful, durable, and consistent. The good news for end users is that the quality traits can easily be identified through visual examination, testing, or simply by asking the right questions. This installment of the column is meant to describe a quality powder coated wood finish, to help prospective buyers identify the differences, and to explain why these quality differences matter.

Consistency

It is relatively straightforward to produce a flawless finish on a single mockup part, whereas accomplishing the same finish throughout a large run (or runs separated by periods of time) is a challenge that requires expertise and tight controls. Consistency is a trait that separates quality manufacturers when it really counts — during production runs. Several aspects make up the concept of a consistent finish on powder coated wood. The main aspects discussed here are color, gloss, and smoothness.

The final color of a powder coated MDF part can be affected by envi-

ronmental factors, such as temperature and humidity. Experienced and knowledgeable manufacturers will be able to compensate for these environmental effects by making system adjustments. The end result is a more consistent output throughout the year. An added step employed by some wood powder coaters is the use of a photospectrometer. Although expensive to purchase, these devices measure light intensity in order to convert colors to a set of digits, removing the subjectivity of color matches. For example, regular use of a photospectrometer ensures that new batches of powder combined with environmental variations won't result in a color different from the customer's expectation. As a result,

some manufacturers are able to guarantee color consistency within predefined parameters. Gloss consistency is similar to color consistency — it can be affected by a variety of controllable factors and should be measured by a gloss meter to ensure consistent output.

Consistency of smoothness can be affected by such elements as powder formulation and heat and cure temperatures. The Powder Coating Institute (PCI) maintains an objective numerical standard for finish smoothness in powder coated surfaces. Insufficient process controls can result in the same powder having a different PCI smoothness when applied on different days. It is

TABLE 1

Here is a summary of key quality traits and methods to evaluate the trait in question.

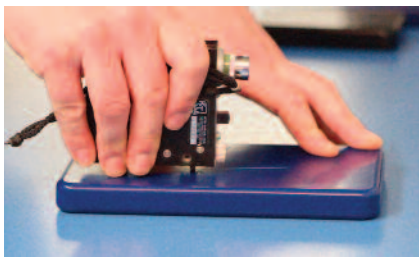
Quality Trait	Steps Taken to Evaluate
Consistency of color, gloss, and smoothness	<ol style="list-style-type: none"> 1. Visual inspection across production runs 2. Manufacturer use of photospectrometer 3. Manufacturer use of PCI smoothness scale 4. Manufacturer use of gloss meter
Coating thickness	<ol style="list-style-type: none"> 1. Ask the manufacturer about standard coating thickness 2. Use coating thickness gauge (does the manufacturer test?)
Fatty edges	<ol style="list-style-type: none"> 1. Visual examination of finished parts
Cure	<ol style="list-style-type: none"> 1. MEK solvent rub test (nothing should rub off)
Tolerance	<ol style="list-style-type: none"> 1. Ask the manufacturer about specific tolerances <ul style="list-style-type: none"> -- Smoothness, color match, gloss level, dimensional tolerances
Powder formulation	<ol style="list-style-type: none"> 1. Ask the manufacturer about custom formulation <ul style="list-style-type: none"> -- Are they able to provide custom formulations for needs, not just custom colors?
Smoothness level	<ol style="list-style-type: none"> 1. Perform visual inspection 2. Perform tactile inspection 3. Use PCI smoothness scale

a simple but important step to determine acceptable smoothness parameters prior to production.

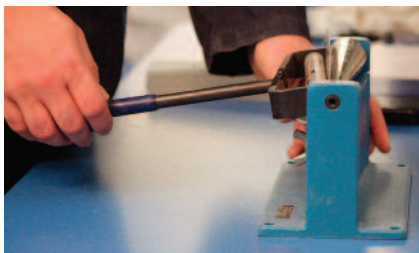
Insufficient board preparation, be it improper sanding, obsolete manufacturing equipment, or surface contaminants, can result in *fiber pop* on a coated product and affect the consistency of smoothness levels. Fiber pop occurs when a fiber from the board pops up when heated, leaving a raised dimple on the surface. Fiber pop can be common in heavily machined areas, so be sure to feel the smoothness of integrated pulls, rounded edges, and other similarly machined details.

Mil thickness

Two powder coated MDF parts may initially look the same but have a very different powder coverage thickness. Coat thickness can affect the longevity and durability of the part; some manufacturers apply 2-3 mils of coverage, while others apply 5-8 mils of coverage. Thicker coatings wear better over time, and testing equipment is readily available to evaluate mil coverage. An easy first step when comparing wood powder coaters is to ask the representative about standard mil thickness. All



A mil thickness meter can be used to test the coating thickness. Thicker coatings wear better. Check for consistency of thickness on various locations.



The Mandrel Bend uses a uniform bend on a metal part to test the flexibility of the finish. Powder formulations can be modified to adjust for flexibility or hardness needs.

manufacturers should know the answer to this question, and some can adjust for your specific needs. Many manufacturers also have the capability of applying different thicknesses to critical and noncritical faces, saving cost.

Aside from the mil thickness on the face of a powder coated MDF part, the edges should also be evaluated. A quality finish will have the same mil coverage on the edges, corners, and face. Thin coverage on the edges will impact durability and can be identified in various ways. The most obvious manifestation is color variation on the edges, sometimes accompanied by surface roughness. Of course, it is also possible to use a mil thickness test to obtain a definitive answer.

Fatty edges

One of the more colorful powder coating industry terms is *fatty edges*. Cheap powder coated MDF finishes are prone to fatty edges, manifested when powder gathers toward the outside edges of a part's face. It creates a picture frame effect, with slightly raised accumulations near the edges. Fatty edges can be identified through visual inspection and are a result of inferior processes and equipment. Proper heating and curing of the part will ensure fatty edges are not present.

Cure

A quality powder coated MDF finish must be cured properly before shipment. Proper cure is important because it ensures the finish is completely bonded to the substrate and

has all of the expected performance characteristics. An uncured finish might look good but is less durable. A standard MEK (methyl ethyl ketone) solvent rub test will confirm cure quality, since a cured finish will not rub off during the test. A side benefit of this test is that it will also identify whether liquid paint has been used to touch up any flaws. Liquid paint rubs off readily in the MEK rub test, while a good powder coated finish will stand up to the solvent.

Tolerance

As mentioned above, a quality wood powder coater will be able to produce a consistently high quality product. When working with company representatives, confirm mutual expectations for finish and machining tolerance. Robust process controls and quality inspections maintain tolerance ranges that are acceptable to both parties. A quality wood powder coater will be able to conform to specific PCI smoothness, CIELAB/ASTM color match guidelines, gloss ranges, and machining dimensional tolerances.

Powder formulation

Powder formulation is a non-obvious variation that can be examined through research and testing. Knowledgeable wood powder coaters work with a variety of powder manufacturers and have established relationships to vary formulation based upon application and customer need. Powder can be formulated specifically for ultraviolet (UV) resistance, chemical resistance, or resistance to cracking. Performance characteristics of a coated part are directly



The pencil test is a simple field test to identify the durability of the powder coated finish. By writing on the surface with a pencil and wiping it off, it is easy to compare hardness, cure, and resiliency of the finish.

affected by the powder formulation used; the best wood powder coaters will be able to understand the application (lab benches, drawer fronts, etc.) and recommend the most suitable formulation.

Smoothness

The most advanced wood powder coaters are constantly pushing the boundaries of smoothness. The good news is that smoothness is easy to identify with a simple visual inspection. Running a hand across the finish, when combined with visual examination, makes it easy to determine a smooth finish. The PCI smoothness scale is great for establishing production tolerances, but visual and tactile examination is sufficient to evaluate quality differences across single parts. Even if your plans call for a textured finish, evaluate the company's smooth finishes as part of the selection process. Smooth finishes expose any flaws and will help determine if you are working with an advanced wood powder coater.

It is important to note that smooth finishes are somewhat straightforward to achieve on a single part, especially on a small sample. Small samples allow powder coaters to apply a thicker coat than normal, making the finish look smoother than could be achieved in production. Be sure to examine the company's larger parts to ensure that they are producing a consistent finish beyond the small sample.

Key takeaways

Much like any other product on the market, there are quality variations across providers and this article is intended to help identify those differences. Because wood powder coating is an evolving technology, there can be disparities in quality of finish from manufacturer to manufacturer. Like any advancement, every end user is not yet familiar with steps that can be taken to evaluate quality. Small samples can be made to give the appearance of a high-end finish, but lasting quality of a production run requires greater scrutiny before engaging a manufacturer. If

you ask the right questions and know what to look for, you'll find a quality wood powder coater. **PC**

Editor's note

For further reading on the problems discussed in this column, see *Powder Coating* magazine's website at www.pcoating.com. Click on Article Index and search by subject category. Have a question? Click on Problem Solving to submit one.

Craig Martin is president of BTD Wood Powder Coating, Brainerd, Minn. He received his MBA from the Carlson School of Management at the University of Minnesota. He has worked extensively in the wood and metal manufacturing industries; during the growth period of metal powder coating in the 1980s, he learned firsthand the benefits of metal powder coating over liquid paint in the store fixture industry. He is now an innovator of powder on wood.



Clint Ellenberg, who works in Business Development at BTD Wood Powder Coating, collaborates with Craig on the column. Clint received his MBA from the University of Texas and his undergraduate degree from Vanderbilt University. Clint's background is in consulting, where he focused on project management and process improvement in healthcare facilities.



With all operations in Minnesota, BTD is a technology leader and manufacturer of high-quality powder coated wood components. The company's website is www.btdwoodpowdercoating.com and representatives can be contacted at info@btdwoodpowdercoating.com or 855/272-1002.

You can also submit a question to Peggy Koop, editor, at 651/287-5603; fax 651/287-5650; e-mail pkoop@cscpub.com. Or go to www.pcoating.com and click on Problem Solving. You can submit a question for this column in a few keystrokes.