

DSM Powder Coating Resins focuses on getting resin technology to make the MDF coating process more robust

Powder coating on MDF



Today, there is a limited number of powder coating lines for MDF – probably less than 40 worldwide. Yet, these pioneer coaters show us that there are plenty of promising opportunities for powder-coated MDF, particularly in applications where a desire for durability is matched by the need for design freedom.

In the world of furniture, powder coating creates great possibilities for the design of dining room tables, kitchen cabinets, storage solutions for home and office, desktops and others. Global manufacturers such as Herman Miller, IKEA and Vitra are using powder-coated MDF in their designs and promoting its design possibilities, resilience and low environmental impact.

COMPLEXITY OF THE COATING PROCESS

Today's MDF powder coaters have worked diligently to find the optimal combination of MDF specifications, treatment of MDF prior to coating, powder coating selection, curing technology, equipment and line configuration to enable the production of high quality products. Yet, it is still not easy for someone to start powder coating on MDF. Although the industry has made great strides in its knowledge, the process is still complex and unforgiving.

Too little thermal exposure results in insufficient melt/flow of powder or insufficient cure of the powder coating. Too much heat results in damage to the MDF. "It is the powder coating's needs that dictate the level of thermal exposure and it's the thermal exposure that narrows the operating window; so, it's imperative that we enable powder coatings to require less heat to work properly", explains Tosko Misev, DSM Powder Coating Resins' R&D Director.

LOOKING FOR THAT PERFECT COATING

Coaters must weigh up the choices that affect performance as they select their powder coating. For some the current choice is UV curing and for others, it is thermosetting powder coating. Some choose pure epoxy and others choose polyester/epoxy hybrid chemistry. One thing is clear: currently there is no single winner.

The development of UV curing powder coating technology allowed the powder coating industry to target the MDF market in the late 1990s. The quick cure allows the board to be subjected to less heat and consequently less damage. And, the separation of the melt and flow from the curing steps offer advantages including the possibility to get a smoother finish.

The inherent shortcomings of UV curing powder coatings

such as insufficient curing in shaded areas and insufficient curing due to the UV light absorption by certain types of pigments, are resolved with adequate lamp configurations and proper pigment selection. One hurdle yet to be overcome is the ability to achieve a layer thick enough to hide fibre popping and sanding marks in smooth finishes. A thick layer is often not thoroughly cured and cracks appear on the board's edges. When two thinner layers are applied to obtain the coating thickness, the coater then struggles with inter-coat adhesion.

LOW-BAKE COATING SOLUTIONS

The introduction of low-bake powder coatings and the use of infrared ovens, enabled the use of thermosetting powder coatings to solve issues that UV powder coatings could not. These developments brought the curing from 180-200°C for 20min to 140-150°C for 5min and significantly decreased the heat load on the MDF. Today the predominant choice for the MDF powder coaters is low-bake thermoset powder coatings.

For low-bake powder coatings, coaters can choose an epoxy or epoxy-polyester hybrid coating. These coatings give the flexibility needed to endure the expansion and contraction of the board without cracking over time and allow the coater to apply one coat, limiting the heat load on the MDF. However, they may compromise on the UV-resistance and have potential of the coating yellowing or chalking over time.

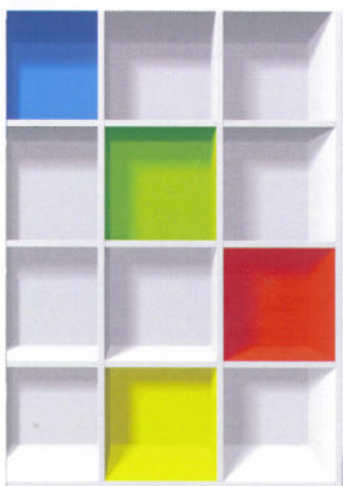
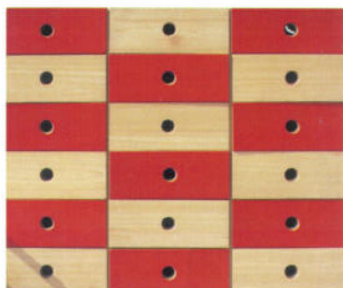
The low-bake dual-layer system consists of an epoxy primer that provides the flexibility needed and an epoxy-polyester hybrid top coat to prevent yellowing and chalking. The downside can be that the board is exposed to more heat by curing two coating layers and the coater walks a finer line between a perfect finish and scrapped parts due to MDF damage.

Currently, high-quality smooth and fine-textured finishes are being produced with powder coatings in a large variety of colours. The industry continues to see improvements in both UV and thermosetting processes, with fewer issues of board conductivity and defects in the finish and less damage to the MDF.

DSM Powder Coating Resins believes in powder coating on substrates such as wood and MDF, and is focusing on closing those gaps the industry is facing. The company works with some of the major powder coating producers and major furniture manufacturers in making this happen.

FUTURE IS BRIGHT

The world of furniture design and manufacturing continues



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to demand more durable surfaces and more choices in materials, shapes and colours. With its properties the powder coating has proven to be a great fit to those needs to create different shapes and apply different colours on MDF. However, the process of getting there still leaves room for improvement. "It is exciting to see what products are currently being produced with powder coated MDF and to imagine what can be done in the future" states Jos Verlaak, Innovation Manager for Wood Substrates, DSM Powder Coating Resins.

The possibilities will grow as new developments enable a more forgiving process and a wider range of finishes and applications and as furniture manufacturers and designers gain more understanding of what powder coatings can do. The resin and curing technologies will continue to play key roles in making the powder coating of MDF and other wood products easier.

"One of the routes is in lessening the thermal exposure of the substrate," states Patrick Niels, Business Unit Director of DSM Powder Coating Resins, "and DSM is committed to collaborate with paint and equipment manufacturers and coaters in developing and promoting powder coating as a sustainable solution to the MDF furniture industry." ■

