Powder coatings for metal furniture are well established in the market. The advantages of powder coatings are generally recognized: no VOC, good quality finish and cost effective. As a result, over the last decades it has replaced liquid coatings for most part in metal furniture.

In the early 2000, powder coating for MDF was introduced in the market to allow the industrial wood market to benefit from all the advantages of powder coating: unfortunately, with only moderate success.

The overlying reason for such limited success was an underestimation by the industry what it takes to switch powder coatings from metal to MDF. Not only the paint and most MDF types were not suitable, but also the application lines were not suitable, as they were still using conventional ovens. As a result the board became too hot, which resulted in a tendency for cracking especially on the edges. This all gave the first generation of powder coatings on MDF a questionable reputation in the industrial wood industry.

In the recent past tremendous progress has been made to make powder coating on MDF a reliable alternative to liquid coatings. Such progress was made possible by building new dedicated powder on MDF lines, using (gas catalytic) IR ovens and the development of lower curing (3-5 min 150 °C) powder technology applied in two layers. Commercial success has been demonstrated by the Kitchen and Office furniture Industry in Belgium and Germany where powder coatings have been successfully applied for several years (fig. 1). This success has been further expanded into other market segments such as child furniture (fig. 2), shop display, bathroom furniture and domestic furniture. A large flat pack company switched from liquid to powder paint for some of their domestic and bathroom furniture. Building on this initial success, more lines were recently commissioned to build and to operate.

A recent technology development by DSM not only further reduces the numbers of layers to one, it is also extremely fast curing (3 min 120 °C, IR), while meeting all the requirements for kitchen cabinets and bathroom and office furniture. This recent development will further allow the industrial wood coating industry to realize the full set of benefits of powder coatings on MDF.

**SUSTAINABLE**

Sustainability is becoming more and more an topic in the office furniture industry, but also in the domestic furniture industry. Depletion of fossil fuels, hazardous materials, land use, greenhouse gasses etc. are becoming more important factors in the decision what material to use. DSM, as a Life Science and Performance Material company, believes sustainability is the only way to ensure prosperity for the future. DSM has a dedicated department for calculating Life Cycle Assessments (LCA) in order to provide information to demonstrate which are most environmentally friendly products or processes.

For several paint systems (liquid and powder) for coating MDF the carbon...
and eco footprint were calculated and compared. The result was that any powder system and in particular our new powder technology can reduce the footprints per coated area by almost a factor of 5! (fig. 3).

**COST EFFECTIVE**

As mentioned previously, powder coatings are very cost effective vs any liquid coatings. This is due to the same reason why powder coating has a very low carbon and eco footprint: it is very efficient to use the paint with little to no waste generation: up to 95% of the powder paint can be used. This in contrast to most liquid coatings where only app 30% of liquid paint ends up on the substrate; the rest is evaporated (solvent, water) or discarded (overspray, sanding). Further cost reduction is achieved by the very fast throughput; less than 30 min from starting the coating process to finishing it. This allows a reduction in Operating Working Capital and increase in delivery speed.

**FREEDOM OF DESIGN**

Powder coating MDF allows to coat any shape, from flat material to intricate shapes such as complex routed furniture for child furniture, interior separation walls, shop displays etc. Often such shapes would be too complex to coat with a liquid system as it would require complicated sanding in between layers due to fibre raising. Powder coatings will open up cost effective design furniture, unheard of or too costly to coat with a liquid paint or with any other finishing technology.

Of course some limitations for powder coatings on wooden substrate still applies especially with respect to type of substrate; although most MDF types are suitable, a challenge remains for other boards such as particle board and for solid wood (except for beech, which can be powder coated). Another limitation is still the appearance of the finish. The paint industry was able to come up with (ultra fine) textured coated finishes for MDF, which was accepted in some market segments currently served by powder coatings such as (some) kitchen cabinet manufacturers and office furniture. DSM and the paint industry are working to develop smoother powder finishes. However, the orange peel effect is an intrinsic phenomenon for all powder coatings. For metal this was accepted by the furniture industry. The future will learn whether the wood coating industry and consumers are willing to accept a light textured or light orange peel for cost effective, excellent wood finish.

DSM and the paint industry is committed to exploit and expand this technology to other substrates and smoother finishes. The future has started and powder coatings on wooden substrates can create a revolution in the market for industrial wood coatings.