

# Digital printing technology carves a new frontier in decorative laminates

As the decorative laminates industry grows, digital printing technology is ready to make a breakthrough. Companies are increasingly adapting under pressure to meet the requirements for rapid introduction of new designs and more flexible production. New product designs have expanded the product reach into markets outside of flooring based applications including furniture. Flooring and furniture still make up the majority of market uptake with other uses including worktops, commercial fittings, wall panels and outdoor building cladding.

There are many manufacturing techniques for laminates that have individual benefits and requirements, but the key principle remains the same. Traditional laminate composition consists of a main core and a stabilizing layer, with the decorative paper and overlay completing the structure. The decorative printed paper and overlay consists of sheets impregnated with thermosetting resins, which are combined under heat and pressure and then pressed onto the supporting core before being adhered to the main board, usually MDF or HDF. Newer and lower cost solutions see the decorative paper and overlay laminated or glued directly to the base board and have no core paper backing. Alternatively, decoration can be printed directly onto the board and then covered with a protective overlay.

Currently, for each paper based composition, the predominant decoration technology is rotary gravure printing using specially blended inks to meet the color requirements of each design. Due to the high light resistance requirements, pigment-based inks are used, with specialist materials being used for effects such as metallic or luster finishes.

## How digital technology can benefit laminate decoration

Digital printing is ready to become the technology of choice as more companies in the laminates industry realize the benefits it can bring to their business, including faster introduction of new designs, increased productivity and reduced printing and storage costs, especially for short runs. There are also potentially new business possibilities from printing personalized, variable or randomized designs, enabling completely new product lines. The ability to print more complex color gradients and finely resolved detail also expands the design possibilities in the industry.

With increasing market demand for customized products, the requirement for digital printing is becoming powerful. Digital decoration allows cost effective production to meet niche requirements without the need to commit to a large print run, allowing the targeting of markets that were previously uneconomic.

For a print run based on the rotary gravure process to be viable this may require 10,000m<sup>2</sup> to be printed in order to offset the cost of the gravure rollers, meaning a large up-front investment based on sales predictions of new design trends. Such volumes require producers to hold stocks of printed décor, which constrains cash flow and increases warehousing costs. The ability to print using digital technology allows production as and when orders are received without the need to hold large volumes of pre-printed inventory. This allows for just in time delivery to the customer without compromising cash flow. Additional cost savings can be made in production, as there is no need to engrave and store cylinders for every new design released. If a new design is introduced to the market and is not successful for any reason, a commitment to a large production run using rotary gravure printing can lead to large levels of waste. Digital production allows the producer to react to customer orders to produce lower volumes and reduce risk.

Gravure printing can limit the design types and styles that can be produced; in particular the range of colors, as each color must be printed with a separate ink. Digital decoration allows designers greater freedom with a much broader color palette or number of colors per design. Sampling and color correction times can also be greatly reduced. The sample can be made on the same system, allowing instant production after designs and colors are approved.

## **Optimization of inks to meet application demands**

With the many advantages of inkjet comes the ability to tune a solution for specific décor and furnishing applications. Each market has precise product requirements to ensure a quality standard, so an “off-the-shelf” solution is rarely available. Therefore, to ensure reliability and maximize performance, a degree of application optimization must be carried out.

Décor papers currently used for gravure printing are extremely porous to allow the lamination process to take place via penetration of the melamine resins embedded within the top layers. Controlling ink color, spread, drying and functional performance is vital to ensure the final product meets the market requirement. Any colorants contained within the ink must be durable to the temperature exposure of the process but also to any end use properties such as light and water fastness, and durability. Whilst some characteristics of the final product can be managed in the down-stream processing, the ink used to create the image is critical to the final performance of the laminate.

Another critical factor is managing the ink within a process. The way the ink works within a specific inkjet print head and with the associated software is absolutely central to maximizing the image quality and ultimate look of the finished product. This, in combination with the ink-substrate interaction, must be controlled to a level that allows consistent and reliable production.

Color control and consistency within the printing process is also important to ensure color matching to a customer approved design that may be in the market for several years. Shade variations within a print also need to be controlled to eliminate factors such as metamerism (the phenomenon where two colors that appear to match under some lighting conditions do not match under other lighting conditions) that are visible to the human eye. Color management starts with the ink and relies on the quality of ink management within the print production process.

Whilst complex in its nature, experienced formulators are able to control very precisely the performance and print quality of an inkjet ink to match the application requirements exactly and deliver a reliable production process.

## **Transforming industrial production**

Digital printing is a viable technology for the laminates industry and has already transformed industrial production in other markets. It is an established technology for the decoration of ceramic tiles and textiles and adopters are reaping the significant benefits that digital has to offer. The key to using an inkjet process successfully is managing and optimizing the ink solution to meet the specific application requirements. With the right ink and process digital technology will transform the manufacturing of decorative surfaces.

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