

The Alternative to Traditional Lacquer

By Jens Fandrey

The typical finishing process entails a substantial capital investment for machinery that requires much physical space. Nevertheless, the process is comprised of several steps—such as the application of several layers of lacquer and intermediate sanding—before a finished product is available. A new combination UV and hot-melt coating technology has been introduced to the wood flooring and veneer industry. It provides an alternative to traditional lacquering technology with the added advantage of a much simpler application process resulting in greater added value and a more economical process.

The Process

This technology is for both rolled materials (Figure 1) and flat substrates (Figure 2). Both coating lines are comprised of simple and proven machine components commonly found on the market. The innovation lies

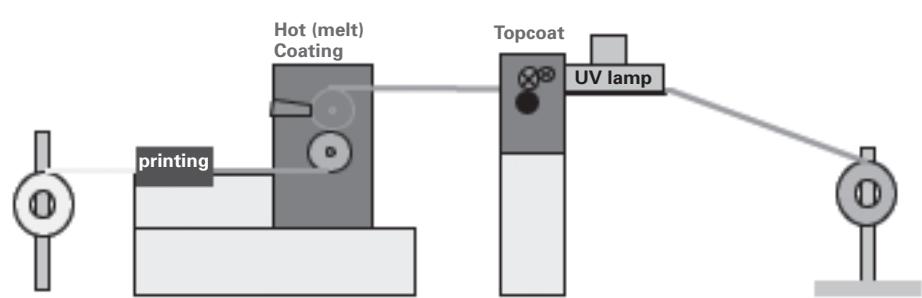
in the arrangement of the machine components and the actual coating. The hot-melt coating offers a wide range of advantages in comparison to traditional finishing lines:

Reduced Costs—It involves a relatively small capital investment in comparison to traditional finishing lines. The one-step finishing process allows for cost savings—no application of several layers of lacquer and no intermediate sanding. The small machine footprint allows for a smaller production area; and electricity requirements are also less—resulting in further cost savings.

Increased Productivity—Finished products are completed in just one simple step. Due to the small machine footprint, several finishing machines can be installed in the same area that one traditional line would accommodate. The technology also allows for greater

FIGURE 1

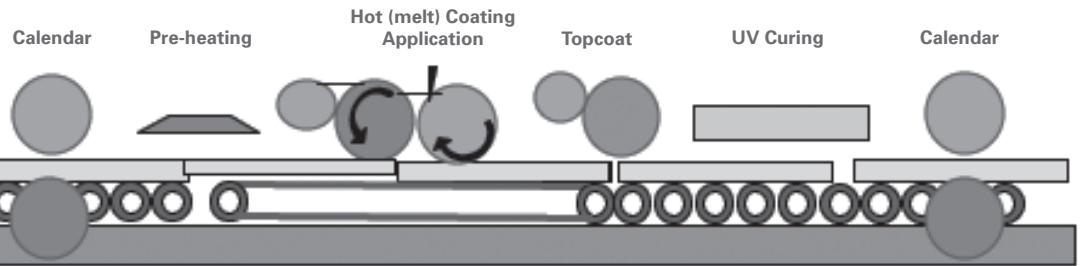
Setup for rolled material



Technology for rolled material refines and finishes material in only one step. Inline staining or printing can be easily integrated into the setup.

FIGURE 2

Setup for flat substrates



Technology for flat substrates refines and finishes material in only one step. The possibility to imprint three-dimensional structures (i.e., pores) with an inline calendar allows for almost unlimited possibilities.

versatility since small batches can be easily produced to meet customer's individual requirements.

Top Quality—Products having the hot-melt coating have excellent durability (up to AC5 rating), very good chemical resistance and high UV stability.

The Coating

The innovative coating is based on a reactive, PUR hot melt system. It is solid at room temperature and is melted with a pre-melter before being applied to the substrate—coat weight is adjustable depending on customer requirements. The chemical crosslinking with humidity of the PUR material results in a very resistant surface that is extremely shock and wear resistant (up to AC5). An additional very thin layer (inline) application of UV-curing topcoat allows for precise variations in gloss level and variations in coloring. In addition, it allows the PUR to cure over a longer period without damage because the UV topcoat gives immediate scratch resistance.

The coating is characterized by:

- Very high scratch, shock and wear resistance (Figure 3)

- No white break/cracking
- Extraordinary flexibility
- Good chemical resistance
- High UV stability

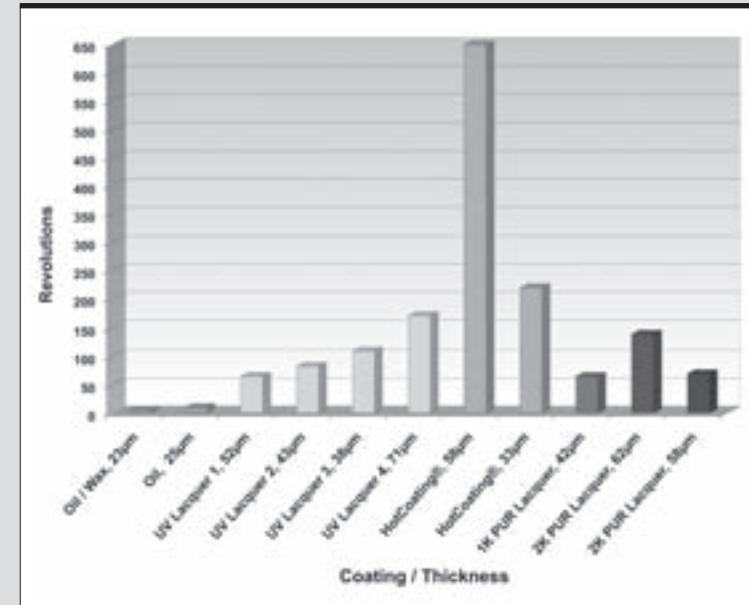
Finished Products—Rolled Material

Rolled materials can be individually designed in the first processing step. Inline staining or printing

(conventional or digital) is easily integrated and takes place before application of the coating. The coating is then applied to rolled material (such as veneer or paper) with a special slot nozzle. After application of the UV-curing topcoat, the rolled material can be immediately wound and is ready for further processing. The end product is a rolled material with a finished,

FIGURE 3

Abrasion resistance of various floor coatings



refined surface with elegant gloss and is distinguished through extraordinary flexibility due to reinforcing and bonding the fibers in coated material. As a result of this flexibility, complex profiles with tight radii can be wrapped (i.e., with veneer) without a problem and larger radii can be wrapped without fleece.

Ready-to-Sell-Veneer

Veneer suppliers and profile wrapping companies started production of hot-melt coated products in order to be able to offer and meet global demand for pre-lacquered surfaces.

Due to the coated materials' extreme flexibility, veneer suppliers get the advantage of being able to offer an already finished veneer that is very suitable for wrapping even small radii without cracks in the lacquered surface. The process for finishing and wrapping veneer is:

1. Finishing the veneer roll in a single pass
2. Wrapping the profile with coated veneer
3. Ready-to-sell product

Machines are already on the market for the production of hot-melt coated veneer and are being operated in several countries, including Germany, Spain, Chile, Italy and Lithuania.

Individually Designed Wrapping Components

Customizing features—such as staining or printing (digital or direct)—can be easily integrated into the inline process. This means that wrapping materials such as veneer and decorative paper can be individually designed and finished in a single piece flow according to customer requirements.

Inline Staining and Surface Finishing of Veneer

Veneer producers must have the possibility to react to the natural

changes of the wood. Adjusting the color of the veneer via stain or slightly colored topcoats is a core know-how of veneering experts. These coloring technologies fit perfectly with this technology, as inline veneer staining is also possible. In addition, the coating has very good and very universal adhesion characteristics to stain (water- or solvent-based) as well as to different topcoats.

Customers are already producing veneer rolls that are individually colored with stain before the coating is applied to achieve a perfect surface coating that protects the veneer and makes it very flexible.

Inline Digital Print

In all industries, there is a trend toward smaller batch sizes. Excluding high-volume markets, the tendency is very clear that end-users, architects and designers want to personally design furniture, windows, doors or flooring. Companies producing these kinds of components increasingly need the option to produce an individually designed component in one batch size. To be able to do this in a cost-effective way, these companies cannot work with minimum quantities in purchasing decorative material. In addition, they have to be able to precisely follow the customer's requirements in design very quickly. The hot-melt coating technology and digital printing technologies are ideally suited to meet these demands.

This technology provides the opportunity to create an individually designed wrapping material and to protect it inline with a very durable and flexible coating—all with a very simple-to-use technology that is absolutely flexible and low in capital investment. The setup for such a line would be:

1. Unwinding base material
(paper, foil, veneer)
2. Digital print
3. Hot-melt coating (PUR) application

4. Topcoat application
5. Rewinding the individually designed wrapping material

Inline Finishing of Decorative Paper

Decorative papers are very common in the furniture, construction and flooring industries to create an image.

In most cases, decorative paper is lacquered to protect the base paper and print against abrasion, moisture and scratches. Due to the high capital investment required for the machinery, paper lacquering technology is focused on high-volume production. Maximum width of paper rolls, high line speeds and long changeover times lead to huge batch sizes in order to make this process economical.

The hot-melt coating process is a very compact and easy-to-operate technology with low capital expenditure and allows for much smaller batch sizes making it the perfect match for digital printing.

Despite the extraordinary flexibility of the hot-melt coating, the finish protects decorative paper with a high-end coating. Due to the higher viscosity and the 100% solid content, the material does not negatively affect the paper with moisture—a closed protection film is created without penetrating too deep into the paper. Since it crosslinks by exposure to humidity, additional energy is not required, so there is no negative impact on the paper due to heat.

The very durable and resistant coating is still very flexible and offers possibilities to use the decorative paper for high-end applications in flooring or even exterior areas.

Finished Products—Flat Components

The coating is applied to flat substrates (i.e., flooring) with a roller coater before the application of a thin layer of UV-curing topcoat. The

possibility to imprint three-dimensional structures (i.e., pores) with an inline calendar allows for almost unlimited possibilities. The end product is a surface which keeps its form as it is extremely shock resistant (pebbles, heels, etc.) due to its flexibility and has very high wear resistance.

Flooring

The flooring market is no longer just reduced to parquet—solid wood flooring versus laminate flooring. New products and further developments led to differentiation and the field of solid wood products has expanded to include solid wood flooring, engineered multilayer parquet, veneer flooring with high-density fiberboard or medium-density fiberboard cores, and printed veneer floor. Laminated flooring has also expanded and is no longer just traditional-made laminate flooring produced as direct-pressure laminate (DPL). This field has also expanded to include high-pressure laminate, DPL, printed direct laminate, digital printed laminate and paper flooring.

Regardless of veneer flooring, paper flooring, direct printed or digital printed flooring, the following holds true:

- Protection is required with a resistant coating;
- Sanding is not possible; and
- Additional requirements include natural haptic, pores, transparent coatings.

The hot-melt coating technology meets these requirements with a simple-to-use, compact technology:

- Protection with up to AC5 coating
- No intermediate sanding required
- Transparent
- Universal adhesion
- Imprinting of three dimensional structure (i.e., pores)

Individually Designed Flat Components

In the flooring market, differentiation and customization are also in demand and there is a wide variety of systems attempting to meet customer's demands in different ways. The hot-melt coating meets these demands with a compact, easy-to-operate line that has a lower capital investment than traditional lacquer lines. It is ideal for finishing and protecting customized flat components such as flooring. Further differentiation and customization can be achieved during the hot-melt coating process via an inline calendar suited for imprinting three-dimensional structures.

Finishing Surfaces with Decorative Surfaces or Digital/Direct Print

Decorative and digital (or direct print surfaces) need to be protected with a shock- and wear-resistant coating, but the surface cannot be sanded prior to the coating process. The hot-melt coating has excellent universal adhesion to various materials (such as paper, print colors and lacquer systems) making it the ideal coating for decorative and printed surfaces. Sanding is not required! It is also transparent so it does not affect the optic of the surface. It is also very shock and wear resistant so the finished product is very durable.

Flooring applications with decorative surfaces or digital/direct printing are suited for long-term use with the hot-melt coating. As a result of the extraordinary flexibility, there is no microcracking which can destroy the sealing characteristics. Even with a low coat weight, it offers a very high wear resistance.

Inline Imprinting of Flat Surfaces

Digital or direct print images provide astonishingly precise depictions of natural substrates. Imprinting a three-dimensional

structure into the protective coating takes this technology one step further to simulate the natural look and feel. The combination of a printed surface (i.e., wood grain print) with the natural structure engraved (pores) adds value to the substrate and brings it closer to actual natural substrate. Imprinting can be done inline in the hot-melt coating process. ▶

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