CEU CONTINUING EDUCATION UNIT

3D laminates (also known as "rigid thermofoils" or RTFs) are a thermoformed decorative surface produced in an array of solid colors, metallics, wood grains and abstract patterns, in a variety of gloss levels and textures. Typically applied to an engineered wood substrate such as medium density fiberboard (MDF), 3D laminate films can be formed around contoured edges and corners giving components the appearance of machined solid wood or various solid surfaces. 3D laminated components are produced using a vacuum forming process known as membrane pressing. 3D laminates provide designers of commercial and residential interiors flexibility to design furniture, fixtures and cabinetry in a variety of shapes without seams or edgebanding.

3D Laminates
Versatile Surfacing Material for Today's Environments

3D LAMINATION IS WHAT ALLOWED RESIDENTIAL STORAGE TO TAKE ON THE LOOK OF FURNITURE.

HISTORY/ORIGIN:

Solid color 3D laminates were developed in Europe in the 1980's to provide consumers with a less expensive alternative to painted kitchen doors. As demand grew, manufacturers developed new methods for printing on film, making other 3D laminate designs such as wood grains commercially available.

As printing technology improved in the 1990's, 3D laminate film manufacturers began partnering with thermally fused melamine (TFM) manufacturers. The resulting programs allowed designers to specify the same design across flat laminated and 3D laminated materials. This coordinated approach made "value engineering" much easier for designers who had to respond to consumer demand for clean, seamless faces and soft edges. By specifying different thicknesses of the same material, it is possible to achieve different levels of performance with the same aesthetic.

Since the 1990's, designers of commercial interiors began to incorporate 3D laminates into office furniture, healthcare components and retail fixtures. Now widely accepted, designers are drawn to 3D laminates because the material helps them create furniture and fixtures that address health and safety concerns while reducing maintenance.

THE MATERIALS USED IN 3D LAMINATES HELP DESIGNERS CREATE FURNITURE AND FIXTURES THAT ADDRESS HEALTH AND SAFETY CONCERNS WHILE REDUCING MAINTENANCE.

PRODUCT DESCRIPTION/ TECHNICAL DEFINITION AND SPECIFICATIONS:

3D laminated components are comprised of three basic material ingredients: an engineered wood substrate, adhesive and thermoplastic film that can be formed in three dimensions using heat and pressure. The process, called "thermoforming" is carried out with either membrane pressing, a membraneless pressing or vacuum forming equipment. 3D lamination encapsulates all top and side surfaces of a three-dimensional component, including raised panels, deep recesses, compound curves and intricate side profiles. The process creates a uniform, seamless finish that cannot be duplicated using conventional finishing techniques.

CNC ROUTERS ARE USED TO CREATE CURVILINEAR, ROUNDED AND 3-DIMENSIONAL PROFILES (AND CORNERS) OF SUBSTRATES IN PREPARATION FOR 3D LAMINATION.

The process creates a uniform, seamless finish.

3D LAMINATE FILMS

The thickness of 3D laminate film varies between .010" to .040". A variety of surface textures (satin, embossed, high gloss) enhance 3D films' aesthetics, and surface coatings are available to reinforce the stain, scratch and wear resistance of the 3D laminate.

The design flexibility of 3D laminates allows users to achieve exotic high end looks without consuming virgin wood or mineral resources from nature. 3D laminate films have the added benefit of being designed for use over reclaimed/recycled engineered wood substrates. MDF is most commonly used as a substrate for thermoforming because its homogenous nature provides a smooth surface and makes it an easy material to machine into contoured shapes. This is important because small imperfections on the surface of the substrate can show through the 3D film, a condition referred to as "telegraphing."

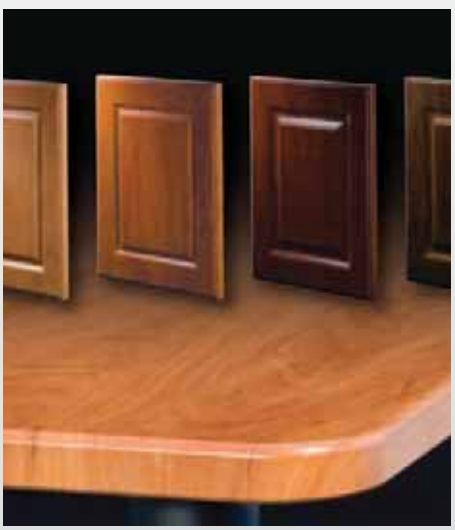
BONDING OF 3D LAMINATE FILM TO SUBSTRATE

3D laminates are bonded to composite wood substrates using adhesives that are reactivated by heat during the thermoforming process. There are two common adhesive methods used in thermoforming.

The first is a two-part polyurethane dispersion (PUD) adhesive in a water-based sprayable form that is sprayed onto the substrate with a HVLP (high-volume, low pressure) gun at the same time as a catalyst. The adhesive is applied to all surfaces of the component that will be in contact with the 3D laminate film, then set on a rack to allow the water to dissipate.

The other adhesive option is a hot melt adhesive that is pre-applied to the 3D laminate film. With both adhesive options, heat from the pressing process is used to reactivate the adhesive, forming a strong and lasting bond between the film and the substrate.

In both adhesion methods, the prepared components are placed into a vacuum former, a membrane press, or a membraneless press. The 3D laminate film is placed on top of the substrate, which is conveyed into the press, The press is sealed and set to a preheat cycle to soften the 3D laminate film. Vacuum and pressure are then applied: the heat melts and activates the adhesive, the pressure (from above) and vacuum (from below) squeeze and stretch the 3D laminate film over the substrate and into the countours, wrapping it seamlessly around all edges.



END USE APPLICATIONS:

3D laminates are extremely versatile and can be used in numerous applications and markets. Primary end markets include kitchen, bath, closet and home storage where 3D laminate is used as door and drawer fronts. The use of 3D laminate in store fixtures and commercial office furniture is also growing due to the material's design flexibility and overall durability. Additionally, because 3D laminates are seamless, hygienic and can be used to laminate soft corners they are increasingly specified for healthcare applications. In all market segments, one of the key advantages of 3D laminates is that design is not dictated by a two-dimensional surface.

DESIGN CONSIDERATIONS:

The primary design advantages of 3D laminates include:

1. The ability to create both contoured and "soft" edges that are ergonomically friendly.
2. Customized shapes produce attributes such as spill containment, grommets, concave/convex designs.
3. Many 3D laminates have matching design programs with popular TFM and HPL designs.
4. 3D laminates have smooth, seamless edges that eliminate the "black line" as well as the need for edge treatments such as T-molding or edgebanding.
5. 3D laminate fully encapsulates the substrate, protecting it from contamination and allowing for easy maintenance.
6. End users have the ability to select specific product attributes such as gauge, gloss, texture, color, and print designs.
7. 3D laminate films can be specified in a variety of thickness and price points allowing for "value engineering" within one material.
8. 3D laminates have excellent impact resistance, and will not chip or crack.

RESIDENTIAL APPLICATIONS:

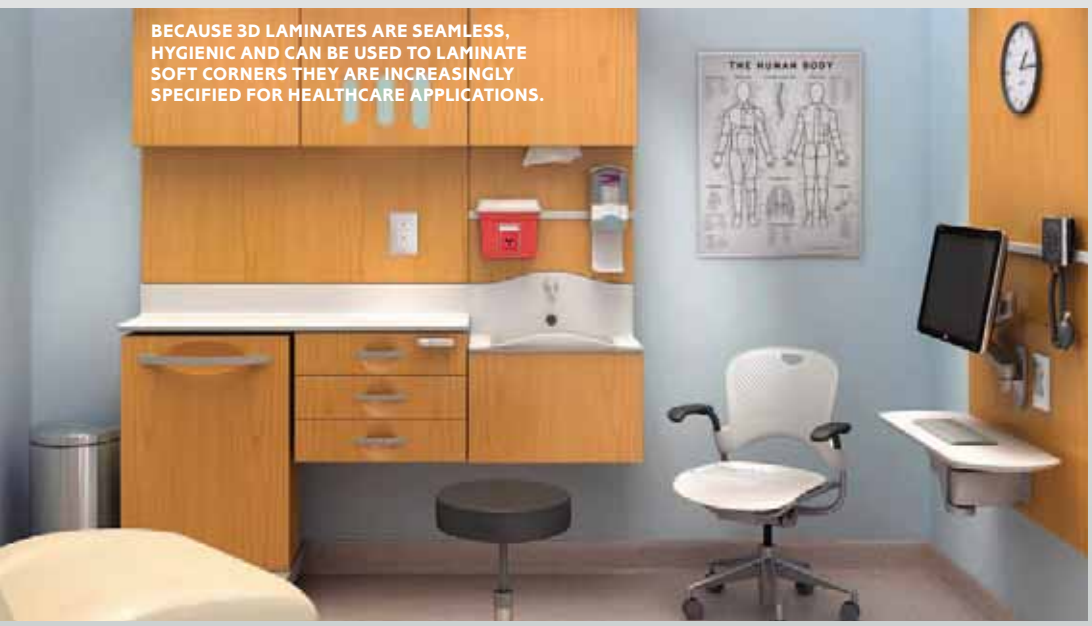
KITCHEN & BATH CABINETS: The thermoforming process used in the production of 3D laminates encapsulates all top and side surfaces of three-dimensional components including raised panels, deep recesses, compound curves, intricate profiles, sharp edges and flat expanses, "One of the big advantages for kitchen and bath is that 3D laminates are water resistant," says Paul Levesque, product manager for Miralis. "Also you can have beautiful faces with contours and exotic finishes at a modest cost."

CLOSET SYSTEMS AND RESIDENTIAL CASE GOODS: Nathan Klomp of JB Cutting worked in the closet industry before moving into panel processing. "3D lamination is what allowed residential storage to take on the look of furniture," says Klomp. "It is the little details, intricate profiles, flourishes and rounded edges, that make casegoods attractive." Klomp also points out that panel goods are often only as convincing as their seams. "If the edgebanding goes bad, or the seams separate and collect dirt, the entire aesthetic is ruined."

COMMERCIAL APPLICATIONS:

OFFICES, INSTITUTIONAL, EDUCATION, HEALTHCARE, HOSPITALITY: 3D laminates are durable, water resistant and easy to clean. Because they completely encapsulate the substrate they prevent contamination and bacterial growth. Alan Applegate is the vice president of business development for Paladin, a company that makes commercial (non-kitchen) components for a variety of applications. "As a manufacturer of decorative wood components, 3D laminates allow our customers to explore the limits of shape and edge design, incorporate 3D features like non-drip trays, and create new functional applications," says Applegate. "And, because 3D laminates are typically thermoformed over an engineered wood substrate the process allows for cost effective design changes and modifications."

STORE FIXTURES: Retailers expect store fixtures to combine attention-getting style with durability at affordable prices. "Custom membrane pressing makes for a great product all the way around," says John Colby, general manager for Piedmont. "It has advantages for store fixtures, kiosks, point of purchase, and other applications, and gives our customers more freedom to create appealing, eye-catching designs. Plus it also does away with square edges and black lined seams." s&p



BECAUSE 3D LAMINATES ARE SEAMLESS, HYGIENIC AND CAN BE USED TO LAMINATE SOFT CORNERS THEY ARE INCREASINGLY SPECIFIED FOR HEALTHCARE APPLICATIONS.

THE USE OF 3D LAMINATE IN STORE FIXTURES AND COMMERCIAL OFFICE FURNITURE IS INCREASING SIGNIFICANTLY DUE TO THE MATERIAL'S DESIGN FLEXIBILITY AND OVERALL DURABILITY.

RESOURCES

The Composite Panel Association (CPA) is the trade association for the North American composite panel and decorative surfacing industries. CPA sponsors an annual Surface & Panel Buyers Guide which provides the most comprehensive information on North American composite panel and decorative surfacing products.

Manufacturers and processors of surface materials should also reference the Voluntary Compendium of Standards for Decorative Overlays which was re-published in July 2009 and is available at www.pbmdf.com. The voluntary standards cover decorative overlays made from cellulosic or polymeric materials. The compendium outlines the attributes of each type of overlay, provides the user with information and industry-accepted test methods to determine the performance and physical characteristics of the different overlays, and allows identification of the appropriate product for a particular application. The decorative overlays covered include decorative foils, three-dimensional lamination overlays, light basis weight papers, oriented polypropylene films (OPP), thermally fused papers, and vinyl films.

HPL is addressed in NEMA's High-Pressure Decorative Laminate standard. The standard covers HPDL sheets that consist of paper, fabrics or other core materials that have been laminated at pressures of more than 5.0 MPa (725 psi) using thermosetting condensation resins as binders. NEMA is the trade association for the electrical manufacturing industry.

For more information visit the Composite Panel Association, DecorativeSurfaces.org at www.pbmdf.com.

CONTINUING EDUCATION UNIT

3D laminates (3DL) – VERSATILE SURFACING MATERIAL FOR TODAY'S ENVIRONMENTS

You will earn one (1) Learning Unit by answering at least 80% of the questions on this page correctly and submitting the responses with your contact information below. A certificate of completion will be sent to you upon receipt of a satisfactory submission. There is no fee.

Take this quiz online at www.DecorativeSurfaces.org

MAIL, FAX OR EMAIL COMPLETED QUIZ TO:

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Composite Panel Association
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Leesburg, VA 20176
703-724-1128, extension 251
Fax: 703-724-1588
email: aosullivan@cpamail.org

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Circle the letter of the correct answer for each question below.

1. **What were 3D laminates originally developed for?**
   A. High-end flooring alternative
   B. Alternative to HPL for wall applications
   C. Alternative to painted kitchen doors
   D. Automobile dashboard alternative

2. **In regard to fabricating 3DL material, the most common substrate used is:**
   A. Medium Density Fiberboard (MDF)
   B. B grade plywood
   C. Particleboard
   D. Most high quality hardwoods

3. **End users have the ability to specify a number of attributes for 3D laminate that best fits the project. In the list below, which attribute is *not* available for modification?**
   A. Requesting the 3D laminate to match in color and print to an existing wood grain design of a different material
   B. Increasing thickness to allow for greater wear resistance in high traffic areas
   C. Adjusting the gloss level up or down to keep design consistency through a room using different materials
   D. Adding or changing the texture of the surface (embossing) to create a specific textured look
   E. None of the above

4. **Edgebanding is required to be used with 3D laminates.** True False

5. **3D laminates are commonly bonded to metal substrates.** True False

6. **Which is *not* a design consideration when using 3D laminates?**
   A. Contoured edges B. Chipping or cracking
   C. Matching designs D. Customized product attributes

7. **3D laminates can help reduce injury risk due to their soft contoured designs.**
   True False

8. **3D laminates are an excellent choice when designing for healthcare furniture, kitchen and bath cabinetry, and retail store fixtures.** True False

9. **Which attributes make 3D laminates a good material specification for healthcare environments?**
   A. Moisture resistance
   B. Edgeband integrity
   C. Soft corners
   D. Both A and C
   E. None of the above

10. **3D laminates are an excellent material choice in retail fixtures because of:**
    A. Clear delineation of seams
    B. Long, flat lines
    C. Impact resistance
    D. All of the above