

# Technology Profile

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## Applying Wood Veneer – Best Practices

The use of wood veneer has been reported as far back as Egyptian times. Since then, craftsmen have used valuable and scarce wood resources of different patterns, colours and pleasant figures to expose this high value material. Since wood veneer has little application on its own, gluing veneer onto lower quality material is a simple solution to extending its use.



Both softwoods and hardwoods can be used for veneer, however the majority of softwood veneer is used as sheathing, structural products or as substrate for higher appearance products.

The inherent qualities of the many hardwood species result

in veneer that is warm and appealing to the eye. Once the log has been processed, the narrow veneer components are usually spliced together to make a full-sized sheet. The highest grade possible is obtained by producing different patterns. Highly decorative effects are usually produced on 4x8-foot sheets by matching veneer components.

### Natural Characteristics of Veneer

- Mineral Streaks are a greenish or darker colour streak that follows the wood grain in the veneer.
- Oxidation Stain is a brown or bluish colour stain; it is restricted to the end grain of the veneer, and appears in the log form before peeling.
- Chemical Stain is an exposure to minerals or chemical during the log processing phase. Usually dark blue, bluish black, grey or brown in colour, the stain depends on the nature of the chemical that comes into contact with the wood.
- Insect Related Stain occurs after insects have tunneled into the tree.
- Vine Marks are compressions that deform the wood grain, usually caused by vines growing around a tree trunk.
- Ribbon Stripes are a figured pattern perpendicular to the wood surface, found mainly in the Sapele wood specie.
- Bird's Eye is spherical wood grain indentations on the veneer surface, present mainly in maple.
- Flakes are high density darker spots on the veneer surface, often found in oak.
- Gum Pockets are found mainly in cherry and some softwood species.
- End Grain Figure (Fiddle Back, Cross Bars, Tiger Stripes, Washboard, Valley Wood, Cross Fire, Cross Figure, etc.) are wavy/curly grains present in many species.
- Bird Pecks are round pecks on the veneer surface that were caused by woodpeckers when the tree was younger.
- Burls are an overgrowth of a dead limb where the wood grain is severely distorted.
- Bark Pockets are an overgrowth of a dead limb where some bark is encased around solid wood during the tree growth.

## Selection

### Face Veneer Classification

**Book Match** - alternating components of veneer are turned over so that adjacent components are opened like a book.

**Slip Match** - veneer components are fed out in sequence without being turned.

**Center Match** - all the components are of the same width and an even number of components are matched from the center line of the panel.

A number of other patterns can be produced to enhance the various veneer characteristics or to impart a unique design on the item to be veneered. These include: Random Match, Pleasing Match, Plank Match, Balance Match, Colour Match, Sequence Matching, Slip and Swing, End Match, Diamond Match, Reverse Diamond, Herringbone, Box Match, Reverse Box Match, Parquet Match, Sunburst, Chessboard, Basket Weave.

## Handling and Storage

Veneer is a thin material and care must be taken when handling and storing it. A few tips to ensure that the veneer remains usable:

### Handling

- Veneer, sliced or peeled, is a fragile material.
- The best way to minimize damage is by handling the material as little as possible. Plan the warehousing and process flow operation to minimize the need to handle the panels. When necessary, handle the panels by sliding on horizontal surfaces.
- Use proper strapping for storage.
- Keep the panels protected until ready to use. Proper dunnage will absorb handling accidents.
- These precautions may not be necessary with sawn veneer because it is thicker. However, care needs to be taken particularly when working with smaller pieces.

Table 1: Common veneer delamination defects.

| Defect  | Cause  | Solution   |
|---|--|--|
| Veneer blow in the hot press                          | <ul style="list-style-type: none"> <li>• Too high moisture content of the veneer and/or substrate panel</li> <li>• Adhesive application rate too high</li> <li>• Temperature of the press too high</li> <li>• Press time too long</li> </ul>           | <ul style="list-style-type: none"> <li>• Reduce moisture content to between 4 and 8%</li> <li>• Reduce the quantity of water in the glue line</li> <li>• Follow recommended gluing parameters</li> <li>• Close and open the press after 30 seconds to let the steam escape</li> </ul>  |
| Telegraphing of the glue onto the veneer surface      | <ul style="list-style-type: none"> <li>• Too much adhesive applied</li> <li>• Glue bleeding through the veneer to the surface</li> <li>• Adhesive viscosity too low</li> <li>• Voids in the core material</li> <li>• Surface irregularities</li> </ul> | <ul style="list-style-type: none"> <li>• Glue spread rate to be from 5 to 8 mils in thickness</li> <li>• Often visible only after finishing</li> </ul>   |
| Veneer delamination                                   | <ul style="list-style-type: none"> <li>• Too high or too low adhesive application</li> <li>• Glue line dry out</li> </ul>  | <ul style="list-style-type: none"> <li>• Follow recommended gluing parameters</li> </ul>   |
| Spotty erratic bonds                                  | <ul style="list-style-type: none"> <li>• Not enough glue transferred to both surfaces</li> <li>• Non uniform platen temperature</li> </ul>   | <ul style="list-style-type: none"> <li>• Increase the glue spread rate</li> <li>• Lamination pressure should be between 100 and 125 psi</li> <li>• Assembly time too long</li> <li>• Pressing time too short</li> </ul>  |
| Poor adhesive transfer to the back face of the veneer | <ul style="list-style-type: none"> <li>• Veneer surface inactivated</li> </ul>   | <ul style="list-style-type: none"> <li>• Proceed with the water drop test; put a drop of water on the surface to be glued and another drop adjacent on a freshly sanded portion of the same surface. The water drop should start to be absorbed in the wood within a minute and be totally absorbed in less than 60 minutes. If not, this surface is likely to be resistant to the adhesive</li> <li>• Wetting and integrity of the joint is compromised</li> <li>• If surface is inactivated, sand the surface with 150 grit paper or wash with alcohol to remove the extractives from the surface to be glued</li> </ul> |

## Storage

- Veneer, either supplied rolled or flat, should be stored horizontally flat, in a dark (especially protected against sunlight), dry (30 to 55% MC) and cool area (15 to 30°C), and off the ground on a rigid 4x8 panel.
- Avoid extreme temperature and relative humidity swings.
- The corners should be prevented from rolling back by adding a light weight close to the corners until the veneer is conditioned and flat.
- Upon receiving the veneer, loosen the bundles to prevent condensation and the formation of mold – allow the material to breathe.



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## Using Veneer

Wood veneer is seldom used alone; it is usually laminated with an adhesive onto a substrate panel. The choice of the substrate is guided by the structural properties needed, the edge appearance desired, and the cost and surface smoothness requirements. The most popular substrates used are: plywood, particleboard, medium density fibreboard (MDF), combination core and solid lumber.

The adhesives used for laminating the veneer over the substrate panels are mainly from the Urea Formaldehyde (UF) or Polyvinyl Acetate (PVA) adhesive families. There are two methods of veneer lamination: applied with a cold press at room temperature and applied with a hot press.

To ensure a good bond between the veneer and the substrate, it is recommended that:

- The moisture content of the veneer and substrate panel should be from 4 to 14%, preferably in the range of 6 to 10% MC.

*Continued on back page*

**Table 2: Veneer trouble shooting.**

| Defect   | Cause  | Solution  |
|--|--|---|
| Barber pole effect                               | <ul style="list-style-type: none"> <li>• Tight and loose sides of veneer spliced together</li> </ul>   | <ul style="list-style-type: none"> <li>• Natural book matching effect of veneer</li> </ul>  |
| Veneer checking, small splits in the face veneer | <ul style="list-style-type: none"> <li>• Sudden changes in moisture content create stress. Usually found after the pressing operation</li> <li>• The finish coat is absorbed differently by the loose and tight sides of the veneer</li> <li>• Sometimes created by the application of a heavy surface finish</li> </ul> | <ul style="list-style-type: none"> <li>• Difficult to repair and easier to identify and reject before lamination</li> <li>• Apply thinner finish coating</li> </ul> |
| Contamination                                    | <ul style="list-style-type: none"> <li>• Evaporated water or solvent that made the wood grain rise (e.g., perspiration, oil, any foreign material)</li> </ul>  | <ul style="list-style-type: none"> <li>• Wipe to clean first then sand to the finishing sanding grit</li> </ul>   |
| Core overlapping                                 | <ul style="list-style-type: none"> <li>• Overlapping of the inner plies</li> <li>• Uneven absorption of the finishing material on the high density spots of the core material</li> </ul>   | <ul style="list-style-type: none"> <li>• Sand the high density area</li> </ul>  |
| Telegraphing                                     | <ul style="list-style-type: none"> <li>• Irregularities in the core (mostly in plywood core material)</li> </ul>   | <ul style="list-style-type: none"> <li>• Fill the voids then sand to the finishing sanding grit</li> </ul>  |
| Delamination                                     | <ul style="list-style-type: none"> <li>• Separation of plies because of adhesive bond failure</li> </ul>   | <ul style="list-style-type: none"> <li>• Re-gluing and repressing when possible</li> </ul>  |
| Glue bleed through, glue spill up                | <ul style="list-style-type: none"> <li>• Adhesive showing through the surface via the pores of open core material</li> <li>• Too generous glue spread</li> </ul>   | <ul style="list-style-type: none"> <li>• Detect the surface glue before processing or sand the glue contaminated area</li> </ul>                                    |
| Iron stain, blue stain                           | <ul style="list-style-type: none"> <li>• Natural defect (i.e., tannic acid comes in contact with iron)</li> </ul>  | <ul style="list-style-type: none"> <li>• Sand or remove chemically</li> </ul>   |
| Knife marks, sanding marks                       | <ul style="list-style-type: none"> <li>• Marks done by the veneer knife</li> <li>• Sanding marks are produced by a too coarse finishing grit</li> </ul>  | <ul style="list-style-type: none"> <li>• Sand to proper finishing grit</li> </ul>   |
| Panel warping                                    | <ul style="list-style-type: none"> <li>• Grain orientation of veneer not consistent</li> <li>• Different species on face and back</li> <li>• Unbalanced layup</li> </ul>   | <ul style="list-style-type: none"> <li>• Ensure balanced layup</li> </ul>   |
| Water spots                                      | <ul style="list-style-type: none"> <li>• Dried water spots</li> </ul>  | <ul style="list-style-type: none"> <li>• Sand</li> </ul>  |
| Ring shake                                       |  | <ul style="list-style-type: none"> <li>• Natural defect</li> </ul>  |



- A pressure of 50 to 125 psi is used, preferably close to or over 100 psi for surfaces with high roughness.
- A glue line thickness of 5 to 8 mils is applied consistently over the substrate.
- The time under pressure follows the adhesive supplier's guidelines and corresponds with the ambient temperature.

### Lamination Trouble Shooting

- Buckling of veneer is a drying defect produced when the end grain of the veneer dries earlier than the rest of the sheet. It can be reduced by rehumidifying and flattening the veneer sheet in a platen hot press.
- Splits are the result of tension produced by the shrinking of the veneer as it dries. Splits can be repaired by hammer tapping. Tapping around the split stretches the material adjacent to the split which in turn fills the open area.
- Visible veneer splice lines are caused by poor splicing practices. As a result, the splicing glue line has to be thicker to fill the void between the two veneer components. Difficult to repair, the visible glue line will be enhanced when the final finish is applied.

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