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Whitening of Beech Veneer due to Moisture

Prior to early 1997 the Association had a number of enquiries regarding the use of beech veneer. The problem encountered had been the whitening of the veneered surface or "wicking' i.e. starting at an edge and working its way up the surface of the veneered panel. Both these forms of whitening are caused by the presence of moisture between the lacquer and the surface of the timber veneer. The moisture causes a milky or white appearance and is a reaction between the moisture and lacquer; the white film sits on the surface of the timber and if sanded off, leaves the timber unmarked.
To address this situation the DWVA sponsored a research project. It is believed the below report concurs with the following DWVA recommendations:

- Only user a good quality two-pack polyurethane lacquer when using beech
- Ensure that all edges are arrised (chamfered or rounded over) to enable an adequate lacquer film thickness around the edges –coatings tend to flow away from sharp corners and thus weaken the finish
- Special care should be taken to ensure the correct gluing of any veneer edge tape so as to avoid any possible breaks in the lacquer film.
- In wet areas use only waterproof substrates under beech veneer.

For more detail refer "A Manual for Decorative Wood Veneering Technology" by Dr Barbara Ozarska, available on the DWVA Website www.woodveneer.asn.au
The research report follows:

Report on the Beech Veneer Research Project

Introduction

The beech veneer research project was developed by the Decorative Wood Veneers Association (DWVA) Technical Committee's response to the problem of whitening of beech veneer in domestic bathroom and kitchen applications.

The project was designed by Dr Barbara Ozarska from the CSIRO Division of Forestry and Forest Products and Bryce McNair of AFRDI/Fumtech and conducted in conjunction with Mayze Corporation who donated the samples and the considerable time it took to prepare them and David Raggatt from Mirotone who arranged for the lacquer to be applied. The humidity conditioning and assessment was done at the CSIRO's Forest Products Laboratory at Clayton.

Objective

To investigate causes of whitening steamed beech veneer in decorative veneered panels used in humid service conditions.

Test Materials

Veneered panels were constructed using typical manufacturing procedures.
Eight types of veneered board were used:

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- HMR particleboard veneered with PVA glue;
- HMR particleboard veneered with UF glue;
- standard particleboard veneered with PVA glue;
- standard particleboard veneered with UF glue;
- HMR MDF veneered with PVA glue;
- HMR MDF veneered with UF glue;
- standard MDF veneered with PVA glue; and
- standard MDF veneered with UF glue.

For each of the 8 board/glue combinations, edged board samples of 120 mm x 300 mm were finished as follows:

- precat and sharp edges;
- precat and round edges;
- PU lacquer and sharp edges;
- PU lacquer and round edges.

There were 32 variations, with three samples of each variation making a total of 96 boards. Each sample was clearly marked.

Method

The panels were prepared by Mayze Corporation and the lacquer applied by Mirotone in Melbourne. They were left for 48 hours and on 23 September installed in a conditioning chamber at the CSIRO's Clayton laboratory. The relative humidity in the chamber was 85% with the temperature set at 30 degrees C. Samples were examined after seven days, 14 days and after 21 days.
After 21 days the samples marked '3' were drilled to ascertain whether breaking of the seal would facilitate the wicking problem. The samples were assessed weekly thereafter, with the last assessment on 7 November - some six weeks after they were first put in the chamber.

Results

Other than slight discolouration noted on the initial assessment (explained below), there was virtually no change in any of the samples over the six weeks, including the samples that were drilled.
The discolouration on the initial assessment was on the labelled side of each sample. The 'stain' was in a circular pattern and could be explained by the samples being placed on a tin or other circular object to dry. The unlabelled side had no such stain.
A smudging effect around the Texta colour markings (which were applied before the lacquer) was also noted on some samples.

Analysis

The problems found in the field did not come out in the experiment. This may be because:

- the lacquer was applied better in a laboratory environment than it is in the field (this is thought to be the case although it assumes that lacquer seal is a major if not predominant factor in the whitening problem);
- the humid environment in the experiment was insufficiently damp to cause the whitening effect (possible but not considered likely):
- the beech veneer used in the trial was less susceptible to whitening than other sources of veneer (unlikely - the veneer used in the trial came from two different sources);
- the glues and lacquers used in the trials were less likely to contribute to the problem than others available in the market (possible); and
- it is possible that some other treatment was applied in service (cleaning detergent which could cause the deterioration of the lacquer).

Overall, the results suggest that properly applied lacquer will prevent the whitening problem from occurring. This was tested by comparing the finish on two of the samples to that on a drawer front which had shown the whitening problem in a domestic bathroom. The results of the assessment against the requirements of

BS 3962 Finishes for Wooden Furniture - Part 6 Assessment of resistance to mechanical damage indicated that both the PU and precat lacquers used in the trial were noticeably stronger than the coating on the board which failed in service.

13th November, 1997