

THE BIOCOMPOSITE STRUCTURE OF DECORATIVE LAMINATES

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Keywords: Biocomposite architecture, Wood fiber, Characterisation, Structural analysis, Decorative laminates

Summary: High Pressure Laminates (HPL) are manufactured by pressing thermoset-impregnated wood fibre-based layers together under high pressure and heat. The result is a wood fiber reinforced plastic composite with several distinct functionalities due to adequate choices of fiber grades, thermoset resin grades, process conditions and manufacturing equipment. When used in applications such as flooring or in kitchen worktops the laminates need to be persistent to abrasion, scratch, staining and burns, but it is also important that their appearance (visual, touch and sound) appeal to the end user. For development of a given strength, appearance and surface topography of a laminate, the process conditions during pressing, the choice of press plate and the choice of materials and structure of the resin-impregnated wood fibre-based layers are essential. Detailed understanding of the structures of these layers is thus important for improving specific characteristics of laminate structures.

The present work includes two decorative laminate samples having the same structural composition, but differing with respect to the surface perception. In addition, the samples were abraded with a rotary abrasion test to create surfaces with different extent of wear. The structural analysis was based on laser profilometry, scanning electron microscopy (SEM) of the laminate surfaces and cross sections and X-ray microtomography. The structural analysis revealed that the difference in perception was primarily due to a roughening effect caused by the pressing conditions. The study also showed visually how the wear gradually removed the surface of the top layer (the overlay) as well as the perceptible roughness, before exposing the lower part of the overlay where ceramic particles were added for abrasion resistance. This insight to the internal architecture of these composite materials will be most valuable for further development of superior laminate surfaces.