

Surface Treatment For Greater Resistance

Dimensional changes when subjected to humidity and susceptibility to biodegradation have prevented wood from wider application. Development in surface treatment technology can help counter these effects. By Dr Antonios N Papadopoulos, TEI of Kavala, and Dr George I Mantanis, TEI of Larissa

The fibrous nature of wood has made it one of the most appropriate and versatile raw materials for a variety of uses. However, two properties restrict its much wider use: dimensional changes when subjected to fluctuating humidity and susceptibility to biodegradation by microorganisms.

The varying moisture content of wood results in dimensional and conformational instability, which can compromise the performance of other materials combined with wood such as adhesives and surface coatings. Until recently, these shortcomings were addressed by impregnating wood with appropriate hydrophobes.

Wood may also be modified so that selected properties are enhanced in a more or less permanent fashion. Changes to wood surface can involve chemical modification, biological modification using enzymes or physical processes such as plasma modification. The reaction is confined to the surface of the wood substrate and the accessibility of reagent and the subsequent clean-up of the modified material are easily accomplished.

Surface modification of wood has been used to improve the ultraviolet (UV) stability of wood, to change the surface energy of wood, for example to reduce wetting by water and/

Table 1: Summary of surface modification methods

Modification method	Sample application(s)
Conventional chemical modification	Stability to weathering, compatibilisation
Chemical modification with bifunctional reagent	Polymer grafting, self bonding, stability to weathering
Surface thermoplasticisation	Self bonding
Coupling agent	Compatibilisation
Chemical activation	Self bonding
Enzymatic activation	Self bonding
Plasma or corona treatment	Compatibilisation, stability to weathering

or to improve compatibility with coatings or matrix materials, and to improve bonding between wood surfaces.

Surface Chemical Modification For UV Stability

Wood degrades when exposed to UV light primarily due to the instability of the lignin polymer. Although clear coatings can be produced that are UV stable, degradation of the underlying