

EXPERIMENTAL RESULTS OF RECLAIMED POLYSTYRENE UTILISATION IN WOOD PRODUCTS

E.V. VOULGARIDIS, C.N. PASSIALIS and J.L. PHILIPPOU

Aristotelian University, School of Forestry and Natural Environment, Section of
Harvesting and Technology of Forest Products, 54124 Thessaloniki, Greece
E-mail: evoulga@for.auth.gr

EXTENDED ABSTRACT

The utilisation of recycled materials may be considered a modern requirement for environmental protection and conservation. Polystyrene in its primary form or as reclaimed material is utilised extensively worldwide for a number of industrial applications such as packaging and insulating products. In wood technology, the styrene after impregnation and polymerization in wood appears to have a number of applications, especially for improving shrinkage and strength properties, but no data are available for the utilization potentials of reclaimed polystyrene. In this work the performance of reclaimed polystyrene (styrofoam) in water repellency, conservation of old waterlogged wood, improvement of properties and gluing processes when applied to wood and to wood products was investigated and assessed.

A proposed method to conserve old waterlogged oak wood by impregnation of the wood with polystyrene diluted in benzene showed satisfactory results. The treatment of old oak wood discs with the proposed method appeared to be simple, cheaper and flexible. No radial checks were formed in the treated discs but the colour of wood became darker after treatment.

The initial effectiveness of water repellent treatments based on polystyrene benzene solutions was found to be comparable to that of commercial water repellent solutions in Scots pine and, especially in beech wood specimens. Certain mechanical properties of commercial particleboards from five factories (bending strength, internal bond and hardness) impregnated with 20% toluene-based polystyrene solution were improved. The physical properties water absorption and thickness swelling after 2-hour water soaking were improved in most cases but thickness swelling after 24-hour water soaking was slightly improved only for particleboards of one type.

The bonding strength in shear for pine and beech wood, particleboards and medium density fiberboards by using an experimental gluing substance from reclaimed polystyrene was found to be improved in the cases of particleboards and fiberboards when compared with the commercial polyvinyl acetate (PVAc) glue. In pine and beech wood no improvement of bonding strength was determined with the experimental glue.

Key words: reclaimed polystyrene, conservation, old waterlogged wood, water repellency, bonding shear strength, pine wood, beech wood, particleboards, fiberboards.