

Investigation the optimum density of Poplar particleboard to reduce resin content and production costs

Farnaz Eslah^{1*}, Ali Akbar Enayati¹, Zahra naghizadeh mahani¹

¹Department of Wood and Paper Science and Technology, Faculty of Natural Resources, University of Tehran, Islamic Republic of Iran.

* Corresponding author, e-mail: eslah68@yahoo.com

Investigation the optimum density of Poplar particleboard to reduce resin content and production costs

Abstract

The developing countries such as Iran, have poor wood resources for particleboard manufacturing. To satisfy the increasing demand for forest products, fast-growing trees such as poplar species are being seriously considered for future supply needs. Board density is one of the most important factors affecting the properties of particleboards and other wood composites. There is a high correlation between board properties and its density and increase in board density results in improvement in board properties. Nowadays, resins used in wood industries are generally heat-cured. UF adhesives are the largest class of amino resins, and are the predominant adhesives for interior grade plywood and particleboard. The increase in formaldehyde-based resins content brings about concerns about human health and the environment. Resin content has an important effect on final price of products. The aim of this study was to explore optimum amount of particleboard density while maintaining boards' quality to reduce Urea- formaldehyde resin content and production costs. Board density at three levels (520, 620 and 720 Kg/m³) and UF resin content (6, 7 and 8%) were variable parameters. The properties evaluated included modulus of elasticity (MOE), modulus of rupture (MOR), internal bonding (IB), and thickness swelling (after 2 and 24 hours immersion in water). The obtained data were statistically analyzed by using the analysis of variance (ANOVA) and Duncan's mean separation testes. The results showed that with increase in board density from 520 to 720 Kg/m³, MOR and MOE were increased and dimensional stability were improved. Increase in board density had no significant effect on IB. Also the patterns of density profile confirmed these results. The results obtained from this study revealed that manufacturing poplar particleboards with density of 620 Kg/m³ and 6% resin content, would result in boards with physical and mechanical properties within those set by corresponding standards. Reduction in resin content, cuts down on, formaldehyde emission as well as production costs.

Key Words: Particleboard, Poplar, Board density, UF resin, Physical- mechanical properties.