

Abstract

In this research possibility of use of cotton stalk (*Gossypium hirsutum L*) in particle board manufacturing in two separate state were investigated. In first state cotton particles mix with poplar wood particles (*Populus nigra*) were used for manufacturing the three layer particle board. The ratio of thickness of middle layer in three levels with ratios at (35:65, 25:75 and 15:85 percent), ratio of melamine formaldehyde resin to urea formaldehyde as bonding factor at three levels (0:100, 10:90 and 20:80 percent) and weight ratio of cotton stalk to poplar chaff in middle layer at three levels (0:100, 6/25:93/75 and 12/5:87/5 percent) as variable factor in this study were choose. Physical and mechanical properties of boards such as water absorption (WA) after 2 and 24 hour, thickness swelling (TS) after 2 and 24 hour, modulus of rupture (MOR), modulus of elasticity (MOE) and internal bonding (IB) were examined with use of EN standard. Based on results of this study, increasing the thickness of surface layer than to middle layer and increasing the melamine formaldehyde than to urea formaldehyde and also increasing the amount of poplar chaff to the cotton stalk in middle layer, caused increase the modulus of rupture and elasticity and internal bonding of samples. Increase of amount of melamine formaldehyde and thickness of surface layer and also decreasing the cotton stalk in middle layer cause decreasing the water absorption and thickness swelling of samples. But in second state of this research, two series veneered and un veneered particle board were made that effect of density, press temperature and press speed on physical and mechanical properties of particle board (one layer) form cotton stalk were evaluated. Density in three levels at (0/8, 0/65 and 0/5 g/cm³), press temperature in two levels at (150 and 180 °c) and speed of closing press at two levels (10 and 20 mm/s) as independent variable factors were choose for this research. After manufacturing the boards for reinforcing the physical and mechanical properties, the boards were veneered with *birch* veneer with 0/65 mm thickness. Physical and mechanical properties of boards were tested with use of EN standard. Results showed that increasing the density and press temperature cause increasing the modulus of elasticity, modulus of rupture and internal bonding, but water absorption and thickness swelling were decreased. Beside, increase the speed of closing press, cause increase the modulus of elasticity and modulus of rupture. But internal bonding of samples were decreases with increase the speed of closing the press. Beside obtained results from T test indicated with veneering, modulus of rupture and modulus of elasticity were strongly increases But veneering have not significant effect on internal bonding. Beside with veneering, water absorption and thickness swelling were decreased.

Key words: Particle board, Urea formaldehyde, Melamine formaldehyde, Cotton stalk, Response state method, Thickness of surface layer to middle.



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**The Thesis Submitted for the Degree of M.Sc (In the Field
of Wood composite products)**

**The effect of ratio of surface layer
thickness to middle layer and melamine
formaldehyde to urea formaldehyde on
properties of particle board made by
cotton stalk**

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January 2015