

The self-bonding poplar wood MDF and its bonding mechanisms of fibers treated with active agents

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Abstract

This paper deals with the self-bonding poplar wood dry-processing MDF and its bonding mechanisms of fibers treated with active agents, such as NaOH, HNO₃ and H₂O₂. Through mathematical analysis of the experiment, the best results have been gained between the variable ranges of parameters.

The optimization conditions are as follows: 1) The ratio of active agent absolute dried weight to the oven dried weight of fibers: 2% for using NaOH as activator. 2) The ratio of gap-filling material absolute dried weight to that of fibers: 10-12%. 3) Temperature of hot press: 220°C. 4) Time of hot press: 18 min. 5) The moisture content of dried fibers: 7-7.5%. The optimization strengths are as follows: MOR: 25(MPa), IB: 0.46 (MPa), MOE: 3680 (MPa), LS: 0.72%, THS: 9.65%, MC: 3.96%, Density: 0.78g/cm³.

The bonding mechanisms of MDF activated with NaOH are: 1) The competition reaction between the degradation and condensation reaction of lignin and gap-filling materials. 2) Bonding between semicellulose and lignin (LCC). 3) Hydrogen bond force and the combination of free radicals.

Keywords Self-bonding, Medium density fiberboard (MDF), Activator, Electronic spin resonance (ESR), Free radicals

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人造板的透气性研究

密西西比林产品研究所研究了一种测定人造板透气性的方法。透气性是气体和蒸汽在人造板板坯中移动难易的量度,在热压过程中强烈的影响着传热和传质。了解了透气性如何随温度和压板压力的变化而变化之后,可以使热压周期缩短,内应力降低,产品质量提高。对大片刨花板的研究表明,压板压力在95—450psi之间、温度在70°—400°F之间时,含水率和刨花大小在热压初期对透气性影响最

大。这是由于蒸汽的影响及使用大片刨花使透气性降低的缘故。研究结果还表明,随着热压时间的延长,温度对木材的塑化影响和压板压力互相作用,使板坯的透气性迅速大幅度下降,使蒸汽密闭于板坯之中,增大了分层的可能性。随着研究的继续开展,有可能确定热压周期的最佳卸压时间,确定各种树脂固含量和碎料类型的影响。

(叶克林)