

Improving the Dimensional Stability of Medium-Density Fiberboard with Bio-Based Additives

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Abstract : Medium density fiberboard (MDF) is a common category of wood-based panels that are widely used in the furniture industry. Fine lignocellulosic fibres are combined with a synthetic resin, mostly urea formaldehyde (UF), and joined together under heat and pressure to form panels. Like solid wood, MDF is a hygroscopic material; therefore, its moisture content depends on the surrounding relative humidity and temperature. In addition, UF is a hydrophilic resin and susceptible to hydrolysis under certain conditions of elevated temperatures and humidity, which cause dimensional instability of the panels. The latter directly affect the performance of final products such as furniture, when they are used in situations of high relative humidity. Existing water-repellent formulations, such as paraffin, present limitations related to their non-renewable nature, cost and highest allowed added amount. Therefore, the aim of the present study was to test the suitability of renewable water repellents as alternative chemicals for enhancing the dimensional stability of MDF panels. A small amount of tall oil based formulations were used as water-repellent agents in the manufacturing of laboratory scale MDF. The effects on dimensional stability, internal bond strength and formaldehyde release of MDF were tested. The results indicated a good potential of tall oil as a bio-based substance of water repellent formulations for improving the dimensional stability of MDF.

Keywords : dimensional stability, medium density fiberboard, tall oil, urea formaldehyde

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