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Study of adhesive bondlines in modified wood with fluorescence microscopy and X-ray micro-computed tomography

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Abstract

The quantitative penetration of three coldset wood adhesives [one-component polyurethane (PU), emulsion polymer isocyanate (EPI), poly (vinyl acetate) (PVAc)] under hydraulic pressure into different types of modified wood was studied using fluorescence microscopy and the results were compared to these of a previous study without pressure on adjacent wood samples. The effective penetration (EP) of PU was negatively affected by furfurylation and NMM modification when pressure was applied. For PVAc, 30% NMM treatment and heat treatment of Scots pine and beech at 210°C had a negative effect on its EP, but against this the EP of this adhesive increased after heat treatment of beech at 195°C. In the case of furfurylation, the depth of penetration of all adhesives was less into wood treated with higher concentration of furfuryl alcohol. PU showed a much deeper penetration into NMM-modified and heat-treated wood than the other adhesives

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