

Correlation between hardness and density profile of glue-laminated timber manufactured from viscoelastic-thermal compression modified *Paraserianthes falcataria* laminas

ABSTRACT

A fast-growing tree species, *Paraserianthes falcataria*, possessed low value in density. Therefore, it was subjected to a densification treatment, i.e., viscoelastic-thermal compression (VTC), to enhance its density and mechanical performance. The objective of this study was to investigate the correlation between the density profile and hardness of VTCmodified glue-laminated timber. The laminas underwent VTC, whereby five different pre-steaming durations were applied, ranging from 0-30 minutes prior to forming into glue-laminated timber panels. The panels were cut into pre-determined test pieces and subjected to density determination using an X-ray densitometer and hardness test in the tangential direction using the ball indentation method. The correlation analysis found that increasing density slightly enhanced the hardness of the tangential surface of the glue-laminated timber test pieces, whereby the Pearson's correlation values, r were .074 (0 minutes, non-densified), .154 (0 minutes, densified), -.027 (10 minutes, densified), .088 (20 minutes, densified), and .225 (30 minutes, densified). Nevertheless, the associations were found to be statistically insignificant because the p -values were greater than 0.05, thus suggesting densification treatment did not enhance hardness.