

FLEXURAL STRENGTH TEST OF LAMINATED BEAMS UTILIZING SAGO BARK WASTE WITH THE ADDITION OF DOWEL BOLTS

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ABSTRACT

Sago bark waste is one of the abundant by-products found in sago-producing regions, yet it has not been optimally utilized. This study aims to investigate the physical and mechanical properties of laminated beams made from sago bark waste and to analyze the effect of dowel bolt connections with varying spacing on the strength enhancement of the beams. Three variations were used in this research: laminated beams without dowels (SL), beams with dowel bolts spaced at 10 cm (SB10), and beams with dowel bolts spaced at 15 cm (SB15).

The results of physical testing showed a moisture content of 14%, with a density of 1.31 g/cm³ and a specific gravity of 1.24 g/cm³, which fall within the normal and safe range for structural timber. Mechanical testing results showed a shear strength of 3.52 MPa, compressive strength of 20.68 MPa, and tensile strength of 113.48 MPa. The bending test revealed that the SB10 variation yielded the best performance, with an average Modulus of Rupture (MOR) of 48.46 MPa and Modulus of Elasticity (MOE) of 7510.50 MPa. The SB15 variation had an MOR of 41.16 MPa and MOE of 7272.70 MPa, while the SL (without dowels) had the lowest values, with an MOR of 28.39 MPa and MOE of 5139.00 MPa. Based on the classification of SNI 7973:2013, the MOR values for SB10 and SB15 fall under Class II (strong), while SL is categorized as Class III (moderately strong). In terms of MOE, SB10 is in Class III (moderately stiff), while SB15 and SL fall into Class IV (less stiff).

It can be concluded that the use of dowel bolt connections with a 10 cm spacing significantly improves both the strength and stiffness of the laminated wood beams compared to the 15 cm spacing and beams without dowels.

Keywords: laminated beam, sago bark waste, dowel bolts, bending strength, tensile strength, compressive strength, modulus of elasticity, modulus of rupture, mechanical properties.