

The effects of orientation on the mechanical and morphological properties of woven kenaf-reinforced poly vinyl butyral film

ABSTRACT

Kenaf is one of the important plants cultivated for natural fibres globally and is regarded as an industrial crop in Malaysia for various applications. This study was conducted to determine the effects of orientation on the tensile and flexural strengths, Charpy impact test, and morphological properties of kenaf fibre-reinforced poly vinyl butyral (PVB) composites. Laminates of 40% fibre weight fraction were manufactured using the hot press manufacturing technique at 0°/90° and 45°/ 45° orientations, and eight specimens were prepared for each test. The mechanical properties of the composites were variably affected by the fibre orientation angle. The results showed that the composites at 0°/90° had the highest tensile strength, flexural strength, and flexural modulus, while the elongation at break was almost the same. Additionally, tests were carried out on the composites to determine their impact energy and impact strength. The results revealed that impact properties were affected in markedly different ways by different orientations. The composite at 45°/ 45° offered better impact properties than the composites at 0°/90°. In addition, scanning electron microscopy for impact specimens was employed to demonstrate the different failures in the fracture surfaces.

Keyword: Different orientation; Kenaf fibres; Mechanical properties; Morphological properties; PVB film