

ABSTRAK

Penelitian ini bertujuan untuk menganalisis pengaruh fraksi volume *gypsum* terhadap sifat akustik dan mekanik komposit berpenguat serat alam. Pengujian *sound insulation* dilakukan menggunakan tabung impedansi, sedangkan sifat mekanik dievaluasi melalui uji *bending*. Hasil penelitian menunjukkan seluruh spesimen memiliki koefisien *sound insulation* tinggi ($\alpha > 0,97$), namun peningkatan kandungan *gypsum* cenderung menurunkan nilai *sound insulation* akibat berkurangnya porositas material. Dari sisi mekanik, spesimen dengan 0% dan 5% *gypsum* menunjukkan tegangan *bending*, modulus elastisitas, dan kekakuan *bending* tertinggi, sementara penambahan *gypsum* hingga 10% dan 15% menyebabkan penurunan sifat mekanik secara signifikan. Perubahan fraksi volume *gypsum* juga memengaruhi momen inersia akibat variasi dimensi spesimen. Kekuatan *bending* tertinggi terdapat pada spesimen dengan persentase *gypsum* 0% dengan nilai rata-rata sebesar $698030,8572 \text{ N/mm}^2$. Pola patahan yang terjadi meliputi *fiber pull-out*, retak matriks, dan kegagalan akibat *voids*. Dengan demikian, kandungan *gypsum* perlu dioptimalkan untuk memperoleh keseimbangan antara kemampuan penyerapan suara dan kekuatan mekanik material.

Kata Kunci : *Sound insulation*, Kekuatan *bending*, *Gypsum*, Pola patahan

ABSTRACT

This study aims to analyze the effect of gypsum volume fraction on the acoustic and mechanical properties of natural fiber–reinforced composites. Sound insulation testing was conducted using an impedance tube, while mechanical properties were evaluated through bending tests. The results show that all specimens exhibited high sound insulation coefficients ($\alpha > 0.97$); however, increasing gypsum content tended to reduce sound insulation performance due to decreased material porosity. From a mechanical perspective, specimens containing 0% and 5% gypsum exhibited the highest bending stress, elastic modulus, and bending stiffness, whereas increasing the gypsum content to 10% and 15% caused a significant reduction in mechanical properties. Variations in gypsum volume fraction also affected the moment of inertia due to changes in specimen dimensions. The highest flexural strength was observed in specimens with 0% gypsum, with an average value of 698,030.8572 N/mm². The observed fracture patterns included fiber pull-out, matrix cracking, and void-induced failure. Therefore, the gypsum content must be optimized to achieve a balance between sound insulation performance and mechanical strength.

Keywords: *Sound insulation, Flexural strength, Gypsum, Fracture pattern*