

## **Effect on mechanical properties by partial replacement of the glass with alkali-treated flax fiber in composite facesheet of sandwich structure**

### **ABSTRACT**

Sandwich structures made of glass-reinforced composite facesheet (FS) and honeycomb core are using in many load-carrying applications. This study aims to reduce the dependency on synthetic materials in the composite FS of sandwich structure. Recently, there has been rapid growth in research and innovation in the hybrid composite to achieve the comparable performance of synthetic materials and reduce the cost, weight, and environmental impact. In the present research, the mechanical properties (tensile, axial compression, and flexural) with flax/glass hybrid composite FS sandwich structure were investigated. The hybrid FS was fabricated with different ratios of glass and alkali-treated flax fiber. The sandwich structure with non-hybrid alkali-treated flax and glass composites FS were fabricated for comparison purposes. The overall results showed the potential of using hybrid reinforcement to improve the structural performance compared to non-hybrid flax composite and revealed the promising and comparable structural performance compared with glass composite. The hybrid composite FS by replacing 25% glass by weight with flax fiber achieved 96% axial compression strength and 92% flexural facing stress of glass composite. The H2 hybrid FS using glass in the outer showed only 6% lower flexural stiffness than non-hybrid glass composite when the normalized flexural stiffness results were compared.

**Keyword:** Flax; Glass; Alkali treatment; Hybrid composite; Sandwich structure; Mechanical testing