

## The bonded macro fiber composite (MFC) and woven kenaf effect analyses on the micro energy harvester performance of kenaf plate using modal testing and Taguchi method

### ABSTRACT

The demand on wind energy application will continue to increase as fossil fuel prices keep increasing and the reservoir keeps decreasing. In wind energy, wind turbine application should be properly selected. The material selection for turbine blade fabrication is highlighted as well in recent research. For green material application, the usage of natural fiber reinforced composite, especially kenaf fiber, in the fabrication of wind turbines needs to be given due attention. Woven and unwoven kenaf fiber is employed to fabricate composite plates which replicate the simple turbine blade model. At the same time, Macro Fiber Composite (MFC) is attached to the kenaf plates for micro energy harvester purposes. There are two methods to attach the MFC used in this study which are surface bonded and embedding into the plate. In order to investigate the effects of bonding MFC technique, modal Testing analysis and Taguchi method is employed. It is found out that the damping percentage of both woven and unwoven kenaf plates increase at 100 % and 50 % respectively when bonded with MFC on their surfaces. Bonded technique is suggested as the most influenced factor in micro energy harvesting at the vibration range of 20 to 60 Hz. It summarized that, the kenaf woven type, the distance from structure neutral axis, the stiffness of structure, the excitation vibration and the neutral frequency of a structure are highlighted as the factors influencing the performance of micro energy harvester as well.

**Keyword:** Modal testing; Kenaf fiber; Woven kenaf; Damping percentage; Natural frequency; Taguchi method