

ABSTRACT

Good performance bow limb can be measure by the ability of the limb to store energy that will be transforms into kinetic energy for the arrow to shot. Bow limb structure that made of sandwich of layered structures desired to be light in weight but also high in strength because it is use by human and bends every time and it can not break while it being used. In search for an alternative design for a bow limb, recent studies in Bio-inspired design of honeycomb that have similar geometry shape of layered structure but with addition of a honeycomb core shows remarkable mechanical performance of the hexagonal honeycomb that promotes a lighter structure while high in strength and have good energy absorption ability that already vastly used in many engineering applications. Hence, honeycomb sandwich structure limbs were made with several variety of parameter factors and levels. Using Taguchi method as an optimization method in order to design and to know the optimized design of honeycomb setup of honeycomb sandwich structure bow limb. Strain energy of each 18 samples were obtained using a 3-Point Bending Test simulation using ASTM D7250 as testing reference on ANSYS static structural. Non-Parametric statistical test was done to obtain which factors is the most significance to the design and use to determine. Resulting an optimized bow limb with honeycomb structure that promote an increasing 132% more strain energy compared to the regular bow limb design. The results of this study may eventually contribute to the alternative bow limb designs.

Keywords: Bow Limb, Honeycomb Structure, Taguchi Optimization Method, 3-Point Bending Test, Energy Strain.