UNIVERSITI TEKNOLOGI MARA
Institut Pengajian Siswazah

THE DOCTORAL RESEARCH ABSTRACTS

Volume: 14, October 2018

14th ISSUE

IGS Biannual Publication

24

Name : NURUL ATIQAH BT. MOHD AYOB

Title : ANALYSIS OF FLUTED NATURAL FIBRE REINFORCED HIGH DENSITY POLYETHYLENE ROOFING PANEL

Supervisor : ASSOC. PROF. DR. MANSUR AHMAD **(MS)**

ASSOC. PROF. DR. KAMARULZAMAN NORDIN **(CS)**

Agriculture sector contributes abundant residues such as bamboo, kenaf and coconut coir fibre. Nowadays, agriculture wastes have the potential as supplementary raw materials due to shortage of forest resources. These residue materials can be fully utilized as a new product through a combination of non-bio material such as synthetic polymer to form bio-degradable polymer composite. This study focused on analyzes the performance of fluted natural fibre reinforced High Density Polyethylene (HDPE) roofing panel using Experimental Analysis and Computer Aided Engineering Analysis. Three types of boards were produced which were Roofing Panel Bamboo Composite, Roofing Panel Coconut Composite, and Roofing Panel Kenaf Composite. Each board types were produced with two fibre ratios which were at forty (40:60) and thirty (30:70) percent. The properties investigated were density, water absorption and thickness swelling, Scanning Electron Microscopic, thermal conductivity, thermal expansion, bending strength and stiffness, tensile strength, impact, and effects of accelerated aging cycle on water absorption and tensile strength. Finite Element Analysis (FEA) was used to analyze the performance analytically. FEA covered heat transfer properties, bending strength and tensile strength. In this study, prototype roofing panel from bamboo, kenaf and coconut coir was also manufactured. The prototype was tested and compared to the industry roofing panel in terms of some physical and mechanical properties. As the result of these investigations, it was concluded that agriculture residue (bamboo, kenaf and coconut coir) were technically suitable raw material for the roofing panel. Kenaf with ratio of 40:60 gave highest density value and lead to better mechanical performance at 21MPa for flexural strength and 14.67MPa for tensile strength. Positive relationship was found on the effects of density on water properties and mechanical properties. There was no interaction found in accelerated aging cycle test between ratio and condition except for Bamboo Fourty (B40) tensile strength and Kenaf Fourty (K40) tensile modulus. The HDPE composite in this study shows comparable values for thermal conductivity and water absorption. It gave value of 0.17 W/mK while Polycarbonate from industrial roofing panel value was at 0.19 W/mK. The primary benefits from this research may be the development of new products to serve growing markets, and thereby relieving some of the pressure to harvest our forestlands.