

## An Experimental Analysis on Enhancement of Mechanical Properties of Paper Pulp-Based Packaging Materials Using Biodegradable Additives

Indupama S.V.A.A.<sup>1,2\*</sup>, Kulasooriya C.M.<sup>2</sup>, Priyadarshana H.V.V.<sup>1,2</sup>, and Koswattage K.R.<sup>2</sup>

<sup>1</sup>*Faculty of Graduate Studies, Sabaragamuwa University of Sri Lanka, Sri Lanka*

<sup>2</sup>*Department of Engineering Technology, Sabaragamuwa University of Sri Lanka, Sri Lanka*

\**amalka@tech.sab.ac.lk*

Molded paper pulp packaging products are gaining popularity around the globe as an environmentally friendly and sustainable alternative to plastic packaging products. In this research, the possibility of enhancing the paper pulp material is experimented with Sugarcane Bagasse Ash (SCBA) as a particulate strengthening additive. To study the impact of SCBA as the matrix material, a total of six samples were prepared by varying the weight fraction of ash and paper pulp as 2.5%, 5%, 7.5%, 10%, 15 %, 20 %, and 25%. A compression molding method was used to prepare cylindrical samples with a diameter of 50 mm and a height of 55 mm. The applied compression force of 2 tonnes was maintained using a specially designed load cell embedded platform to minimize the effect of residual stresses generated during the sample preparation. Soon after the molding of the wet pulp, cylindrical blocks were oven-dried at 105 0C for 48 hours of time to remove excess moisture from the samples. Subsequently, all the samples underwent moisture content testing by periodically measuring their weight. The prepared samples were tested for their compressive strength using a Universal Testing Machine (UTM). Both load and compressive stress acting on the sample were mapped against the deflection of the sample. For the analysis, the deflection of each sample was analysed at 9.0 KN load and the sample with 20% SCBA showed the least strain of 0.38. Therefore, the results clearly show that the sample which with 20% of SCBA content has the highest compressive strength compared to other samples. Overall, most of the SCBA mixed samples show superior compressive strength compared to the pure paper pulp-based sample.

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