

Fabrication of Hard Board Briquette Using Waste Papers and Coconut Husk Fibers

D. M. N. T. Dissanayake¹ and V. H. P. Vitharana^{1*,2}

^{1*}*Department of Science and Technology, Uva Wellassa University, Badulla, Sri Lanka*

²*Department of Engineering Technology, University of Ruhuna, Kamburupitiya, Sri Lanka*

The annual coconut yield in Sri Lanka is estimated as 2450 million nuts. Coconut husk fibers possess specific features such as higher lignin, lower cellulose, and hemicelluloses which leads to properties like resilience, strength, damping, resistance to attrition, and high elongation at break. Approximately 280 tons of paper wastes are collected per day in Sri Lanka. The objectives of this research were to add value to the coconut husk by introducing the hardboard to fabricate low-cost hardboard with high strength, and thereby to introduce a solution for paper waste accumulation in Sri Lanka. The hardboard briquette has been fabricated using coconut husk fibers, paper pulp, starch, and pure epoxy-based adhesive. The short length (around 1 cm) coconut husk fibers and paper pulp were mixed with pure epoxy-based adhesive and starch as binding materials and next compressed under 6894 N m^{-2} of pressure in a die and sun-dried for five days. The composites have a ratio of 3:1, 5:3, 1:1, 3:5 and 3:1 between paper pulp, coconut husk fibers showed the tensile strengths of 1518879 N m^{-2} , 1190175 N m^{-2} , 2340818 N m^{-2} , 1431441 N m^{-2} , and 2407740 N m^{-2} and compressive strengths of $12652940 \text{ N m}^{-2}$, 3438566 N m^{-2} , 6132221 N m^{-2} , 2099790 N m^{-2} , and $19100570 \text{ N m}^{-2}$ respectively. The stiffness and the strength of composite material are increased by fibers. Lignin provides strength to the coconut husk fiber and it is degradable at only a few microorganisms and strong chemicals. The sample that contained the greatest amount of fiber mass showed the highest tensile strength and compressive strength. Therefore, the fabricated hardboard briquette is capable to bear higher loads and it can be utilized in furniture and packing industries.

Keywords: Coconut husk fibers, Hardboard briquette, Waste papers