USE OF WASTE POLYETHYLENE TO PRODUCE CEILING MATERIAL

By

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ABSTRACT

Ceilings have both functional and aesthetic aspects that promote their usability in several different ways. Ceilings hide stored electrical lines and pipes, provide good acoustics by minimizing unnecessary sound, and have the ability to reflect and scatter light, reducing the demand for artificial lighting and thereby lowering energy usage. However, ceiling materials have functional limitations and environmental drawbacks, including sagging, discoloration, and instability during natural disasters. Therefore, the improvement of physical and mechanical properties, durability, reduced maintenance, and resistance to climate changes are important.

Using waste materials for reusing and developing composite materials is an innovative and sustainable approach to overcome environmental challenges and promote circular economy principles. The main aim of this research is to develop a ceiling material utilizing waste LDPE and natural coir fiber as composites to use as an alternative ceiling material. Furthermore, the ceilings have properties such as bending strength, water absorption, tensile strength, durability, swelling, and deflection and in this research the experiment series have been carried out to determine the deflection, swelling and water absorption of the composite material. According to the composite production results, it can be concluded that the coir weight fraction 30% & the LDPE fraction 70% of the total weight are most suitable percentages to produce the composite. A maximum 9 mm sagging deflection and 5.05 mm hogging deflection were obtained during the experiments. During the swelling experiments, the thickness increased only by 25% of its original thickness. Accordingly, the deflection and swelling of the coir fiber reinforced LDPE composites significantly become constant with time and as per the results durability can increase while applying the water proofing agent. As a validation of the comparison of cost between the materials, the unit cost of the asbestos ceiling sheet is lesser compared to the production cost for the coir-LDPE composite ceiling product.

Due to the economic crisisin the county, the availability of other ceiling materials availability can be less. However, the raw materials of the coir-LDPE composite are available in all over the country. Finally, it can be concluded that the composite material which developed by this study can be used as a ceiling materials with a solution for the environmental pollution with further recommendations as researches regarding experimenting mechanical properties of the composite, embodied energy, bio degradability and life cycle costing.