BUSITEMA UNIVERSITY

FACULTY OF ENGINEERING

DEPARTMENT OF TEXTILE AND GINNIG ENGINEERING

MAKING PAVERS FROM POLYETHYLENE TEREPHTHALATE WASTE AND SAND REINFORCED WITH COTTON WASTE

BY

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A final year project proposal submitted to the Department of Textile and Ginning Engineering as a partial fulfillment for the award of Bachelor of Science in Textile Engineering

ABSTRACT

Plastics, especially polyethylene terephthalate (PET bottles) are rapidly growing segment of the solid waste in Kampala city and Uganda as a whole. Disposal of waste materials including waste plastic bags and cotton wastes has become a serious problem. In order to overcome this issue, they should be reused in an effective way. Pavement blocks are perfect materials on the pathways and streets for simple laying and finishing. The PET waste was mixed with sand at a ratio of 1:1 and cotton waste was added as a reinforcement was added in bits of 0%, 0.5%, 1%, 1.5% and 2% of the weight of the mixture. The pavers were produced by compression molding and compressive strength, flexural strength and water absorption properties were tested. A testometric materials testing machine was used to test compressive strength and flexural strength. An analytical balance was used to measure the weights of the pavers and water absorption was calculated. The effect of cotton waste addition on the physical and mechanical properties of the pavers was analyzed using ANOVA software. The paver containing 2% cotton showed the highest compressive strength (5.4891 N/mm^2) and it also showed the highest flexural strength (8.330 N/mm^2) compared to the sample without cotton waste (0%) which showed compressive strength (3.78898 N/mm^2) and flexural strength of 0.584 N/mm^2. Data analysis using ANOVA showed a significant effect of increasing cotton waste on compressive and flexural strength but showed less effect on water absorption.

DECLARATION

I **NGOMA CHARLES** declare to the best of my knowledge that this project report is as a result of my research and effort, except where explicit citations have been made and it has never been presented or submitted to any institution or university for any academic award.

DATE ..21/05/2019.....

SIGNATURE .....

APPROVAL

This project report has been submitted to the department of Textile and ginning Engineering for examination with approval from the following supervisors:

MAIN SUPERVISOR

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CO-SUPERVISOR

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LIST OF ACCRONYMS

PET.....Polyethylene terephthalate

PP.....Polypropylene

HDPE.....High density polyethylene

LDPE.....Low density polyethylene

ASTM.....American standard of testing materials

ISO.....International standards organization

FPR.....Fiber reinforced polymer

NEMA.....National environment management authority

Kg.....Kilograms

ICBP..... Interlocking Concrete Block Pavers

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CHAPTER ONE: INTRODUCTION

1.1 Back ground

The use of Polyethylene terephthalate also known as PET is increasingly becoming paramount among manufacturers in Uganda, as they use these PET bottles to package their products because it (PET) is an excellent barrier material with high strength, thermal stability and transparency. Consumer also prefer or choose PET because it is inexpensive, light weight and recyclable among other reasons(David, 2010). PET is strong, recyclable and available making it fit for use for this research. PET is the common name for a unique plastic belonging to the polyester family. PET polyester is formed from ethylene glycol (EG) and terephthalic acid (TPA), sometimes called "purified terephthalic acid" or PTA(O'Callaghan, 2017). It is estimated that about 13-14 million tons of PET are being produced as waste annually. PET belongs to thermoplastics with excellent physical properties. It constitutes around 18% of the total polymers produced worldwide and over 60% of its production is used for synthetic fibers and bottles, which consume approximately 30% of global PET demand .Efforts are put forward to see that all these plastic wastes are recycled or reused into useful materials to protect the environment from pollution for example, through reinforcing them with fibers into composites(Palakurthi, 2016).

The interest and development of composites making use of natural fibers for example cotton, aimed for structural applications, is growing from a long-term to sustainable perspective. Fiber-reinforced polymers (FRP) are relatively new materials in the construction of structural members and parts to provide alternatives to natural minerals which are used today in order to save the environment. Advantages such as low weight, resistance to corrosion and low maintenance costs make this type of materials an attractive alternative to traditional materials such as wood, steel and concrete(Raftoyiannis, 2012).

Cotton is a strong natural vegetable fiber and the most important vegetable fiber, it is grown on large scale globally and in Uganda in particular. Cotton was introduced in Uganda in 1903. Cotton in Uganda is cultivated at altitudes varying from 3,500 feet to 4,500 feet above sea level and is entirely rain fed(Faso, Eastern and Africa, 2013). Cotton ginning involves separating cotton fibers from its seeds. 1 bale (560 Kgs) of seed cotton gives you 1 bale (185 Kgs) of cotton lint, 350 Kgs of cotton seeds and the balance is un cleaned cotton which consists of seeds and trash which can also be called cotton waste(Raftoyiannis, 2012). An initiative of utilize the cotton waste with PET plastics which are all over the place leading to land pollution to make a new construction material comes in to play. In 2005, Binci

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