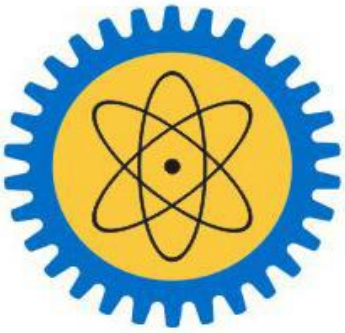

BUSITEMA UNIVERSITY

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FACULTY OF ENGINEERING.

DEPARTMENT OF WATER RESOURCES ENGINEERING.

FINAL YEAR PROJECT.

INVESTIGATING THE EFFECTIVENESS OF POLYPROPYLENE CEMENT BAGS IN REINFORCING CONCRETE.

BY

AMOIT KEVIN

(BU/UP/2018/3600)

SUPERVISORS:

MR. TIGALANA DANIEL AND MR. TUMUSIIME GODIAS.

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A final year project proposal submitted to the Department of Mining and Water Resources Engineering as a partial fulfilment of the requirements for the award of a Bachelor of Science degree in Water Resources Engineering

ABSTRACT.

There has been use of Polypropylene (PP) for packing cement due high strength and high tear resistance. Due to these excellent properties the present study investigates the effectiveness of PP cement bags in reinforcing of concrete. parameters such as workability, compressive strength, splitting tensile strength and flexural strength were evaluated. Design of experiments using CCD in RSM in the Minitab software was used to obtain the number of runs with varying parameters such as thread length (30mm to 60mm) and thread content (0% to 3%). Concrete with and without PP threads with a characteristic compressive strength of 25 Mpa was designed. Concrete cubes, cylinder and prismatic specimens were cast and tested. The analysis of results (ANOVA) for all properties was used predict the fresh and hardened properties. surface, contour and optimization plots were used to obtain the optimum mix ratio. cost comparison was done based on unit cost method estimation. The Test results indicated the use of PP threads can significantly improve the flexural and splitting tensile strengths of concrete materials whereas it resulted a no significant change in compressive strength. The relative increase in split tensile was optimum at 1.5% dosage of 60mm thread length and flexural strength was optimum at 1.5% dosage of 45mm thread length ,though most of the specimens achieved the target strength of 31.56Mpa, decrease in compressive strength was observed and a mild decrease was 20.6% at 3% dosage of 45mm thread length at 28 days .The prediction model established by the RSM showed the correlation and predictability between the response and the factors, and the corresponding relationship equation between the factors and the response was obtained. Results of multi objective optimization indicated that the optimal of the two factors (thread length and thread content) was 1.6% and 56mm respectively with a 0.866 desirability.The use of pp cement bags in reinforcing concrete is economical in terms of cost and eliminates the problem of landfills, reducing the environmental risk, maintaining the ecological balance, which is very much required for our nation.The findings suggested that PP threads deriving from these waste cement bags are a feasible option for fiber-reinforced concrete productions.

DECLARATION.

I **AMOIT KEVIN** hereby declare that this report in this form, nature, organization and content is my own work and has never been presented to any other institution of learning for an academic award.

Signature ……

Date……

Contact…….

APPROVAL.

This project proposal report has been approved of by my supervisors mentioned below.

MR. TIGALANA DANIEL.

Signature …….

Date……...

MR. TUMUSIIME GODIAS.

Signature …….

Date……...

ACKNOWLEDGEMENT.

Above all I thank the Almighty God for His provisions, good health, protection and for bringing me this far.

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My uttermost thanks go to all my friends and colleagues for the assistance they have given me up to final stage of this report especially Mr. Waiswa Emmanuel and Mr. Muruhura Nickson for their guidance and prayers.

Special thanks go to parents for emotional, spiritual; thank you my parents NTALO FRIDAY PETER and NAKATO ALICE for your prayers and support offered to make it possible to complete this project.

DEDICATION.

I dedicate this project proposal report to my beloved parents Mr. NTALO FRIDAY PETER and NAKATO ALICE, my siblings and friends for their encouragement and financial support towards my academic struggle. May God bless them.

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LIST OF ACRONYMS.

ASTM……. American Society of Testing and Materials

RA……. Recycled aggregates

BS ……. British Standard

OPC……Ordinary Portland cement

NC……. normal concrete

PP…… Polypropylene.

% ……...Percentage

W% ……Percentage of water content

OMC……. ……. optimum moisture content

CCD……central composite design

RSM……. Response Surface Methodology.

Tl……thread length.

Tc……thread content.

CHAPTER ONE: INTRODUCTION.

1.0. Introduction.

This chapter presents the background information of the project in details, factors limiting its re use in construction and what has been done to improve its applicability. It also explains various alternatives available and also presents the problem statement, the objectives, research questions and the scope of the study with the justification.

1.1. Background of the study.

Concrete is a buildings material made from a mixture of cement, sand, broken stone or gravel, and water(Purwandito, n.d.). Plain concrete is inherently in brittle nature and have some dramatic disadvantages such as poor deformability and weak crack resistance in the practical usage. In addition, their tensile strength and flexural strength is relatively low compared to their compressive strength(Al-Kubaisy & Zamin Jumaat, 2000). Many attempts have been done to convert cementitious system to a structural material with desirable physical and mechanical properties(Irwan et al., 2013). Improving the brittleness of these materials is the key point to make them suitable as structural material with desirable physical and mechanical properties(Qin et al., 2019). The reuse of plastic wastes plays an important role in sustainable solid waste management. From different points of view, it helps to save natural resources that are not replenished, it decreases the pollution of the environment and it also helps to save and recycle energy production processes(Ghernouti et al., 2015).Numerous studies have been conducted to find the optimum content of these materials in concrete that does not negatively influence the engineering properties of concrete (Chen et al., 2015). By embedding conventional steel bars in the concrete and to some extent by addition of sufficient volume of certain fibers, the tensile strength of concrete can be overcome (Jan et al., 2018).Waste materials such as plastics, which present environmental hazards and are often landfilled, can be used in concrete for different applications. Compared to other materials, plastics have lower cost, a higher strength-to-weight ratio, are more durable (resistant to deterioration), easy to work and shape and have a low density(Abousnina et al., 2021). Incorporating plastics in concrete will not only provide safe disposal but may also improve the concrete properties including tensile strength, chemical resistance, drying shrinkage and creep(Murali et al., 2012). The global market value for polypropylene (pp) woven bags is estimated at 31798.8 million dollars by 2026. The significant applications of pp bags are packaging of cement, chemicals, fertilizers, grains, animal feeds, and pet products. The market segments indicates that pp cement packaging is the largest end-user and account for 26% of the global sales of polypropylene bags. Uganda produces about 6,800,000 metric tonnes of cement annually. PP bags are on high demand because of these reasons; easy availability, strong, durable, long lasting, impermeable to water, tear resistance, chemical resistance, weather proof, light weight, easy to stack(Chourasia et al., 2019). Reducing, recycling and reuse is becoming a world-renowned proverb nowadays. To prolong the shelf life of the packed products, woven fabric used for packing cement normally has high strength and tear resistance. Thus, it is expected that mixing PP threads in concrete would provide an excellent resistance to stress and cracking. The purpose of this study is to reinforce plain

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