



FACULTY OF ENGINEERING

DEPARTMENT OF MINING AND WATER RESOURCES ENGINEERING

FINAL YEAR PROJECT

**INVESTIGATING THE PERFORMANCE OF PALM OIL SHELL AS A PARTIAL
REPLACEMENT OF COARSE AGGREGATE IN CONCRETE**

BY

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ABSTRACT

Aggregates provide volume at low cost, comprising 75 percent to 85 percent of the concrete. With increasing concern over the excessive exploitation of natural and quality aggregates, the aggregate produced from industrial wastes and agriculture wastes being viable new source for building material. The rising cost of construction material has also become a matter of concern. The reason for increase in cost is high demand of concrete and scarcity of raw material. Hence most of the researchers have focus on use of the waste materials in concrete according to their properties. This research was carried out to determine the possibilities of using Crushed Palm oil shells as aggregates in concrete. In this study, the physical properties of crushed palm oil shells as aggregates were determined. Properties of concrete such as slump, density, compressive strength and tensile strength were also determined

In this study, Class 25 grade of concrete with a mix ratio of 1:1.5:3 (cement, sand, aggregates) was produced by replacing crushed stones partial by crushed palm oil shell in percentages of 0%, 10%, 20%, 30%, 40% and 50%. 36 cubes and 10 cylinders were casted and their compressive strength was tested after 7, 14 and 28 days and tensile strength was evaluated at 28 days.

The findings indicated that water absorption of the palm oil shell aggregate was high about 12 % but the bulk density, crushing value and impact value were comparable to that of other lightweight aggregates.

10% and 20% replacements gave the highest strength of 22.23N/mm^2 and 17.52N/mm^2 which was above 17.2N/mm^2 (minimum) for structural light weight concrete. Consequently it is concluded that Palm oil Shells Can be used as coarse aggregate in concrete. Its utilization is cost effective and eco-friendly

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ACCRONYMS

UNDP	United Nations Development Program
CPOS	Crushed Palm Oil Shells
EC	Euro Codes
BS	British Standards
AASHTO	American Association of State High Way and Transportation Officials
ASTM	American Society for Testing and Materials
SLWC	Structural light weight concrete

DECLARATION

I BYENTAKA TONNY of Busitema University do declare that this project report on the investigating the performance of using crushed palm oil shell as a partial replacement of coarse aggregate in concrete is as a result of my own research and has never been presented in any academic institution for any award.

Signature: Date:

APPROVAL

This project report on investigating the performance of using crushed palm oil shell as partial replacement of coarse aggregate in concrete has been written under the supervision of;

Main supervisor

Name:..... Signature Date.....

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CHAPTER ONE

1.0 Introduction

This chapter outlines the relevant information and clearly shows the problem of interest for the intended research. It contains the background of the problem, the problem statement, objectives its scope and justification of the research proposal

1.1 Background of the study

Infrastructure development across the world created demand for construction materials. Concrete is the premier civil engineering construction material. Concrete manufacturing involve consumption of ingredients like cement, aggregates, water and admixture(s). Among all the ingredients, aggregates form the major part. (Shannag, Charif, Naser, Faisal, & Karim, 2014) reported that coarse aggregate constitutes about 75% to 85% of the concrete matrix. With this large proportion of the concrete occupied by aggregates, it is expected for aggregates to have profound influence on the properties of concrete and its general performance. Concrete being one of the major building materials that is used virtually in all aspects of construction and could be delivered to the job site, and be molded in situ or pre-cast to any form or shape, makes it a material of choice in construction. Hence the significance and relevance of coarse aggregate in concrete production in all areas of civil engineering practice and building construction cannot be ignored.

Global demand for aggregates was estimated to be 48.3 billion metric tons in 2015 (freedomia group, 2015) and in 2016, the demand for stone aggregates in **Uganda** was estimated to be 8.3 Million tons (UNDP, 2018) Use of natural aggregate in such a rate leads to a question about the preservation of natural aggregates sources. In addition, operations associated with aggregate extraction and processing are the principal causes of environmental concerns. It was reported by Mehta (2001) that “cement production, coarse aggregate mining, processing and transportation operations accounts for about 7% of the global loading of carbon dioxide into the atmosphere due to considerable amount of energy consumed, thereby affecting the ecology of the forested areas and river beds.

Uganda being a developing country with Population growth (about 3.3% per annum) is increasing at a rate faster than housing construction rates (2.7% per annum) (UNDP, 2018), implying a growing housing deficit that in turn suggests that a greater proportion of the population (in real

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