THE EFFECT OF COCONUT WASTE ON CONCRETE STRUCTURE COMPONENT

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SUPERVISOR DECLARATION

"I hereby declare that I have read this thesis and in my opinion this report is sufficient in terms of scope and quality for the award of the degree of Bachelor of Mechanical Engineering (Structure and Materials)"

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DECLARATION

"I hereby declare that the work in this report is my own except for summaries and quotations which have been duly acknowledged."

Signature : 

Author : IZZAD AMIR BIN ABDUL KARIM

Date : 02 JULY 2012

Especially to

Beloved Father and Mother

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ABSTRAK

Dalam kajian ini, tumpuan utama adalah untuk menyiasat kesan sisa kelapa dalam komponen struktur konkrit. Antara keperluannya adalah untuk menyiasat kesan sisa kelapa di dalam konkrit di bawah kekuatan mampatan. Ini adalah kerana sisa kelapa adalah bahan yang boleh membantu sifat-sifat kekuatan konkrit seperti tempurung dan sabut kelapa. Ia mempunyai ciri-ciri ketahanan yang baik, keliatan yang tinggi dan sifat tahan lelasan, ia adalah sesuai untuk penggunaan yang ada. Sabut kelapa terdapat dalam komposisi kimia walaupun kandungan lignin adalah lebih tinggi dan kandungan selulosa adalah lebih rendah. Sisa kelapa boleh digunakan daripada dilupuskan terutamanya bahagian sabut kelapa, ia dapat di jadikan bahan berguna dalam pembentukan adunan untuk pembinaan perumahan. Oleh itu, kajian mendalam akan dibuat untuk memastikan penggunaan sisa kelapa yang sesuai seperti sabut kelapa dengan menjalankan beberapa eksperimen untuk mendapatkan keputusan yang baik.

Kata kunci: Sisa kelapa, konkrit ringan, kekuatan mampatan, penyerapan air, ketumpatan.

ABSTRACT

In this research, the main focus is to investigation the effect of coconut waste in concrete structure component. Between the need to investigated in the effect of coconut waste in concrete under compressive strength. This is because coconuts waste in there that can help the strength properties of concrete such as coconut shells. It has good durability characteristic, high toughness and abrasion resistant properties; it is suitable to standing use. The coconut fibers have in chemical composition although lignin content is higher and cellulose content is lower. The used of coconut waste from the dispose of coconut fibers could be a useful material in the formation of an admixture for housing construction. Therefore, in-depth study will be made to ensure the appropriate use coconut waste such as coconut fibers by conducting some experiment so as to obtain good result.

Key words: Coconut waste, lightweight concrete, compressive strength water absorption, density.

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LIST OF ABBREVIATION AND SYMBOLS

ρ	=	density
ρ_o	=	Initial density (g/cm^3)
ρ_1	=	Density after crushing (g/cm^3)
V	=	Volume (m^3, cm^3)
m	=	Mass (g)
g/m^3	=	gram per meter cubic (unit of density)

CHAPTER 1

INTRODUCTION

1.0 Introduction

In this chapter, we can know about the objective of the project, the problem statement, and the project scope. All the related information will also be stated clearly so reader will have preliminary view to this project and also know the project goal. In this research, the main focus is to investigating the effect of coconut waste in structure.

1.1 Problem Statement

A large amount of agricultural waste was disposed in most of tropical countries especially in Asia for countries like Thailand, Philippine and Malaysia. According to a survey conducted by the Agricultural Ministry of Malaysia, there are about 156,000 hectares of coconut plantation in Peninsular Malaysia alone [1]. If the waste cannot be disposed properly it would lead to social and environmental problem. Utilized these disposed material was one method of treating the agricultural waste from waste to wealth. The used of coconut waste from the dispose of coconut shell could be a useful material in the formation of an admixture for housing construction. Besides that, in all over the world, concrete is a major materials used

because the materials needed by the concrete are available in most part of the world and it does not required any complex or expensive equipment to make it. Concrete is used all over the world to make pavement, architectural structure, pipe, foundations, roads, bridges, parking structures, brick/block wall and many more. By comparing concrete with other man-made materials in the world, it had shown that concrete is used more and about 7.5 cubic kilometers of the concrete are made each year according to Bjorn Lornborg [2].

1.2 Objectives

The objectives of this study are as listed below:

a) To investigate the mechanical properties composite structure materials
b) To investigate the microstructure of composite structure materials.

1.3 Scope

a) Investigate the percentage of weight composition for concrete component
b) Investigate the relationship between the coconut wastes to the strength of concrete structure component
c) Investigate and conclude all the data and came out with the result related to the objective.

1.4 Significant of Study

The main purpose of this study was to utilise waste to wealth where coconut waste were added into the concrete so that it increase the strength of the concrete. The advantages of using waste material like coconut waste were that they can be reused without affecting the environment By reusing, that mean the waste would be less and it improve the environment of the earth. Beside strength, coconut waste also can help in reducing the cracking in the concrete. Moreover, the curing also affects the strength of the concrete and this point was investigated.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter discussed previous study related to the effect of coconut waste in concrete under compressive strength in term of the engineering properties of the concrete and coconut waste. Besides that, this chapter also reviews the performance of the concrete and coconut waste in the existing application.

2.2 Introduction to Concrete

Nowadays, the concrete was the most widely used man-made construction material in mostly every type and size of engineering and architectural structure all around the world [2]. Concrete major used were for buildings, columns, beams, roofs, floor slabs, foundation walls, footings, staircases, sidewalks, paving, highways, bridges and the list go on. Concrete was widely used all around the world because of its advantages which are fireproof, watertight, economical and easy to make. Besides that, it also offers surface continuity and solidity which it was bond with other materials.

2.2.1 Historical of Concrete

According to H.L.Simmons (2007), the usage of concrete can trace back as early as third century B.C. where the Romans were using concrete made with lime, broken stones and sand to build temples and other buildings [3]. First, the surface of the concrete was left rough and finished it with a form of stucco. Later on, they began to produce a decorative finish by embed small stones in the concrete surface. Finally, they incorporated broken terra cotta roof tiles by embedding it at the outer surface of the concrete and this led to the manufacture of the clay bricks. After the collapse of the Roman Empire, the concrete technology was fall into disuse and was remained unknown until the time of Renaissance. Around 15th century, 'De architecture', the book series written by Roman architect and engineer Marcus Vitruvius Pollio became a famous object to be study. But it was until the end of 18th century where the research of the concrete technology was resumed and by the year of 1824, the essential ingredient in the modem concrete was just discovered [4].

Figure 2.1: Hadrian's Pantheon in Rome is an example of Roman concrete construction.

2.3 What is a Concrete

In its simplest form, concrete is a mixture of paste and aggregates. The paste, composed of Portland cement and water, coats the surface of the fine and coarse aggregates. Through a chemical reaction called hydration, the paste hardens and gains strength to form the rock-like mass known as concrete [5].

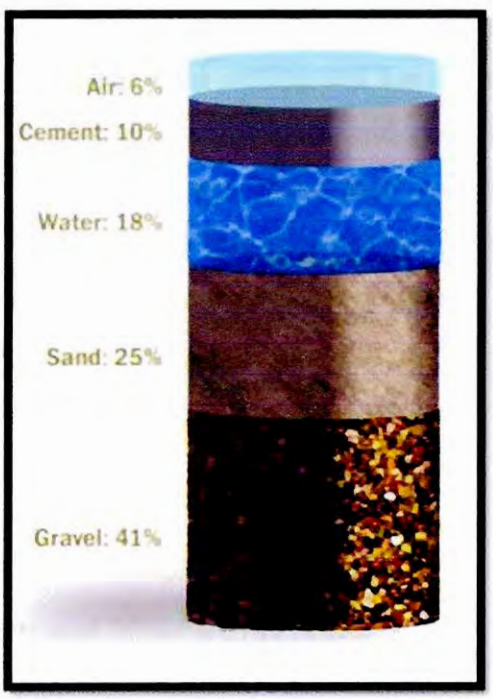

Figure 2.2: The Mix in Ready Mixed concrete

2.4 Limitation of Concrete

According to U.S. Department of Army (1999), there were some limitations of the concrete where the concrete causes cracking and other weaknesses in the structural that detract from the appearance, serviceability, and useful life of the concrete structure.

2.4.1 Low Tensile Strength

Concrete is good at compressive strength but not in tensile strength. So, concrete members which subjected to the tensile stress must be reinforced with the steel bars to prevent cracking and failure during construction.

2.4.2 Thermal Movements

When the concrete was setting and hardening, the heat of hydration would raises the concrete temperature and then it gradually cools. The changes in the temperature can cause early cracking and severe thermal strains. Besides that, concrete that hardened would be expands and contracts when there were changes in the temperature. So, to prevent this kind of failure, expansion and contraction joints must be provided in the concrete structures.

2.4.3 Dying Shrinkage and Moisture Movements

When concrete was dry and harden, it would shrinks and when concrete getting wet and dry, it would be expands and contracts. These kinds of movements would cause unsightly cracks and control joints must be provided. For preventing drying shrinkage, the surface of the newly lay concrete must be kept moist continuously during the curing process. Meanwhile, when the concrete was hard enough, moisture was applied so that it would not damage the concrete's surface.

2.5 Fresh Concrete

A fresh concrete was a concrete in the relatively fluid state and readily to be molded but the shape of the fresh concrete would slowly change if the mold was immediately removed. The fresh concrete mixed would kept all the grains of the sand and gravel encased and held in place where it was called homogeneous. The quality and characteristic of the finish product normally influence by the degree of the plasticity and significant changes in the mix proportions would affect the plasticity of the concrete. Below here were the properties of the fresh concrete according to T.W.Love and U.S. Department of Army (1999) [5].

2.5.1 Workability

Workability stands for the relative ease or difficulty when placing and consolidating the concrete in the formwork. By using slump test, the consistency of the mixture can be measured and can be maintained as necessary for us to obtain the required workability that we needed for the specific condition and method of placement. To have a low slump, a very stiff mixed was required and it was desirable for many uses. The workability was controlled by the amounts and proportion of the fine to course aggregate used with a given quantity of the paste.

2.5.2 Non Segregation

A fresh concrete should be handle with care when mixing and compacting so that there would be minimum of segregation and the mixture would be remain homogeneous. Besides that, care must also be taken in handling so that it can prevent bleeding of the concrete. For example, fresh concrete should not be drop or free fall from more than 3 to 5 feet high to