

CHAPTER 1

INTRODUCTION

1.1 Background

Today, the construction industry in Malaysia has increased rapidly from day to day. Since there is large demand on building construction, the problem of building materials shortage is risen up. Therefore, an investigation on the use of waste materials as concrete product has been done in order to cope the materials shortage problem. In Malaysia, the production of waste materials is abundantly available everywhere such as palm oil fuel ash (POFA), rice husk, sawdust and many more. As an example, nowadays sawdust is very abundant in the tropical country like Southeast Asia and West Africa (Paramasivam and Loke, 1980). Recycling of waste material appears to be solution not only to the pollution problem but also to the problem of economic design of building.

Sawdust is an example of waste material that has been used from time to time for making lightweight concrete. It is relatively abundant and inexpensive material that can be easily obtained in the country. It is waste material from timber industry that is currently disposed in sanitary landfills and open dumped in uncontrolled handling. Disposal of this waste material led to certain serious environment problem and health hazards (Elinwa and Mahmood, 2002). In order to resolve the issue, an advanced action has to be taken by recycling the sawdust to make concrete as replacement of materials due to highly demands in concrete building in all over the world. As a result, by utilizing sawdust as partial sand replacement in concrete, it can be solved the problem of fine aggregate shortage and environmental problem can be reduced indirectly.

1.2 Problem Statement

Disposal of abundant sawdust is a major issue in Malaysia. Landfill to dump the waste is currently getting lesser due to excessive sawdust production. Most wastes are currently disposed in sanitary landfills or open dumped into uncontrolled waste pits and open areas (Turgut, 2007). The sawdust generated from timber industry is dumped as waste thus causing pollution to the environment and also discomfort to the surrounding community. As a result, it gives serious impact on health problem of mankind in Malaysia.

Currently, concrete remains the most popular construction material in the country. Therefore, because of that, critical use of sand occurs day by day due to highly demand by concrete industry for making concrete (Turgut, 2007). In order to fulfill the demand from the customer, excessively river sand mining has been conducted and will cause imbalance in ecosystem. So that, by utilizing of this waste as concrete material replacement the amount of waste can be reduced at dumping landfill and the river sand mining activity can be controlled despite on producing lightweight and eco-friendly building in Malaysia.

1.3 Objectives

The objectives of this study are as follows:

- i. To investigate the effect of sawdust as partial sand replacement on compressive strength and workability of concrete.
- ii. To determine the effect of sawdust as partial sand replacement on flexural strength of concrete.
- iii. To investigate the effect of sawdust as partial sand replacement on water absorption of concrete.

1.4 Significance of Research

The main purpose of this research is to cater the issue of excessive sand mining in the country. Sand and gravel mining has been one of the serious environmental problems around the globe in recent years. This often results in land degradation, loss of agricultural lands and biodiversity as well increased poverty among people. In addition, mining of sand frequently generates land use conflicts in populated areas due to its

negative externalities including noise, dust, truck traffic, pollution and visually unpleasant landscapes. Due to this serious problem, the civil engineer has been challenged to replace the sand by using waste materials as construction materials. In this research, waste material that will be used is sawdust, the by-product from timber industry. Thus, the use of sawdust in concrete mix has the potential to reduce the excessive sand mining activity in the country.

1.5 Scope of Study

The main purpose of this study is to investigate the mechanical properties of concrete containing sawdust as partial sand replacement. Two types of mix will be prepared in this research which is sawdust concrete and plain concrete as comparison purpose. Plain concrete will be prepared as a control and for sawdust concrete, three samples will be casted for each percentages of sawdust used. When concrete is freshly mixed, it will undergo workability test which is slump test. The concrete grade is 30 N/mm² after 28 days of curing and concrete block size is 100mm x 100mm x 100mm and beam size is 100mm x 100mm x 500mm.

The method for curing all the specimens is by water curing within 7, 14 and 28 days. Water curing is the protection of fresh concrete from evaporation which might adversely affect cement hydration. The specimens will be immersed in curing tank for the certain days and kept in relative humidity and surrounding temperature. After curing process, compressive strength test, flexural strength test and water absorption test will be carried out for the concrete containing sawdust.

1.6 Layout of Thesis

Chapter one consists of information that give general idea about the research. It includes the background of the study and problem statement. Objectives of the research that need to be carried out and the significance of study are included in this chapter. Scope of study is also described in this section.

Next, in chapter two, it is about literature review on mechanical properties of concrete containing sawdust as partial sand replacement. First, history of sand regarding to the shortage of concrete materials and the characteristics of fine aggregate has been briefly discussed. Then, it continues to review the methodology of mix design and