CHAPTER 1

INTRODUCTION

1.1 Background of study

A brick is one of the building component used to produce walls, pavements and other materials in masonry construction. Brick is a material that lasts an incredibly long time and practically it no need to maintenance. Generally, the term of brick mention to a unit composed of clay, but now used to represent any rectangular units laid in mortar. A brick can be composed of clay-bearing soil, sand, and lime, or concrete materials. Bricks are manufacture in various classes, types, materials, and sizes which is different with other region and time period, and they are produced in large quantities. Cement sand brick or concrete masonry unit (CMU) is a concrete block that made from cement and aggregate which are generally from sand.

Palm Oil Fuel Ash or POFA is a waste materials that been produce from burning palm oil husk and palm oil shell in the boiler of palm oil mill. POFA is categorized as a mineral admixture. POFA is agricultural by-products which possess pozzolanic properties due to its chemical composition which is high in silica. According to ASTM C 618 pozzolanic materials can be interpret as siliceous or siliceous and aluminous materials which on themselves possess little or no cementitious value but will in finely divided form and in the presence of moisture, chemically react with calcium hydroxide at ordinary temperatures to form compound possessing cementitious properties. Since Malaysia is the one of the country that produce palm oil, there are a lot of POFA that have been produce each year. Malaysia facing problems in disposing palm oil fuel ash, a by-product of palm oil mill since many years ago. To counter this problem, the researcher use POFA and other waste material to add into the brick as a partial sand replacement to the mixes to minimize the uses of natural aggregate.

1.2 Problem statement

Sand is a key ingredient in the construction industry, especially those involving concrete and road construction. Sand is also widely used for the work of land reclamation and the construction of artificial islands. Sand mining is the removal of sand from their natural configuration, mainly through an open pit. However, sand is also mined from beaches, inland dunes and dredged from ocean beds and river beds. The other reason of sand mining is to extract the minerals such as rutile, ilmenite and zircon, which contain useful component for the industry titanium and zirconium. These minerals typically occur combined with ordinary sand which is dug up. The valuable minerals being separated in water by their different densities and the remaining ordinary sand re-deposited.

However, in recent years several studies have established that human uses of sandy beaches causes significant damages to those ecosystems (Noriega & Schlacher, 2012). Sand mining contribute to impact the river bank erosion, and also cause the destruction of ecosystems of aquatic life. The sand mining also causes turbidity in the water, where it is harmful for the organisms that need sunlight. It also effect the flow of the river where the river will become deeper and swift. People who rely to river water will become worse because the water quality at downstream will be decrease and watersheds resources will be contaminated. Plentiful publications have been write with respect to these effects, and the upcoming footstep to do is to minimize, deter or fixing these environmental problem, as a mitigating measures (Pielou, 1966).

Since Malaysia is one of the world's largest exporter of palm oil. Every year, a lot of palm oil being produce. In 2007, there are around 3 million tons of POFA was produced in Malaysia and 100,000 tons of POFA is produced annually in Thailand. This value is likely to getting rise due to the increment plantation of palm oil trees (Navid Ranjbar, 2014). POFA is waste material that contribute to the environmental pollution. Therefore, to reduce the disposal of POFA thus reducing the use of natural aggregate this product innovation ideas was come out. This also due to the emerged from the government's intention to progressively move forward to the application of green technology and businesses manage waste efficiently palm oil industry.

1.3 Objective

The objective of study are :

I. To investigate the effect of POFA as partial sand replacement on compressive strength of cement sand brick.
II. To investigate the effect of POFA as partial sand replacement on flexural strength of cement sand brick.
III. To investigate the effect of POFA as partial sand replacement on water absorption of cement sand brick.

1.4 Scope of study

The research is to to incorporate ground Palm Oil Fuel Ash in the production of cement sand brick. Generally, this research purpose is to determine the mechanical properties of cement sand brick containing ground POFA. There are six mixes that being used. One of the mix that have been used is 100% sand as a control mix. For the other mixes, the percentage of POFA used as partial cement replacement is limited 5%, 10%, 15%, 20%, and 25%, only. All the sample were cured using air curing. The compressive strength test and flexural strength test were conducted at the age of 7, 14, 28 and 60 days. The test of water absorption was conducted at age 28 days.

1.5 Significance of study

In order to solving problem on how to minimize the Palm Oil Fuel Ash wastage is by replace partially quantity of cement sand brick. Using POFA in making cement sand brick will reduce the pollution because we can minimize the disposal of palm waste materials. At the same time, it will decrease the sand mining activity and also can reduce dependency on uses of natural resources. Besides, by using this POFA in brick making industry it will be advantage for the industry to convert the dispose materials into the construction field. It is because they no need to pay to dispose the waste materials to the landfill and at the same time it can reduce the cost of disposal. By doing this, we can sustain our environment without the pollution. The other waste material can be recycled and produce new product. The incorporation of oil palm industry in cement sand brick is