4 WORKABILITY AND COMPRESSIVE STRENGTH OF PALM OIL FUEL ASH (POFA) CONCRETE

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4.1 INTRODUCTION

Concrete has been widely used in the construction industry in the world, including Malaysia. This condition is the result of its property which is very strong in compression, durable, good in fire resistance (Owaid *et al*., 2014; Mohamad *et al.,* 2016) and low in maintenance expenses although it is also brittle and has low tensile strength (Yassin and Abdullah, 2015). As a developing country, the construction industry in Malaysia will keep growing and continues to use concrete as the construction material. Since cement is a vital material in the production of concrete, the production of cement creates environmental issues such as depleting resources and emission of CO2. Therefore, a lot of investigations have been made to utilize new materials to replace cement partially to produce a greener concrete. Up to date, a lot of research has been carried out to use by-product waste from industries for this purpose (Mohammed *et al*., 2012). One of the products investigated in recent years is Palm Oil Fuel Ash (POFA) due to its pozzolanic content. POFA is a solid waste by-product of palm oil industry obtained in the form of ash from the burning of palm oil husk and palm kernel shell used as fuel in the steam boiler of the palm oil mill. In Malaysia, there is a lot of palm oil mill produce this by-product. Thus, this study intends

to determine the workability and compressive strength of concrete using POFA as partial replacement of cement in the concrete. The proportions of POFA used in this study are 5%, 15% and 25% of total cement. The concrete specimens were tested for compressive strength at the age of 7, 14 and 28 days.

4.2 LITERATURE REVIEW

Palm Oil Fuel Ash (POFA) is a by-product waste from the palm oil industries. Since Malaysia produces a lot of palm oil, abundant of POFA is produced as a waste after processing the ripe palm oil fruit. This by-product waste must be managed properly in order to reduce air pollution, environmental impacts and can be used as green materials for the construction of infrastructures in Malaysia. POFA has now become an option to fly ash. Fly ash is a fine powder that is a by-product of burning pulverized coal in electric generation power plants. Due to limited sources of fly ash from the coal, the construction industries are looking into POFA as pozzolan and green material to produce high-performance concrete. POFA is obtained by burning the palm oil fibre and shell through the combustion process. Figure 4.1 shows the process from palm fruits bunches through combustion, which produces POFA and bio-energy as green products. The empty fruit bunches and palm fruits are isolated from each other through sterilization and stripping process.