

Determining the Suitability of POFA as Partial Replacement to Cement in Concrete for Acoustic Properties: Sounds Transmission Loss and Sounds Absorption Assessment

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Abstract. Abundance of palm oil fuel ash (POFA) produced by the process of burning fibers and fruit bunches as fuel has contribute to several problems related to the space and environmental control. By having an alternative to manage and control the POFA as agricultural waste, it can give great benefits in construction industry for replacing the dependence of Ordinary Portland Cement (OPC) as binder in concrete. The properties of POFA itself are close to the OPC as binder in concrete yet there are some other unique characteristic of POFA in providing a better acoustical performance in a concrete. In this study shown that by replacing some part of cement with POFA in concrete mixture, it contribute to greater acoustical performance due to the high sound transmission loss and sound absorption found in this study. This study focus on single concrete mix with water cement ratio of 0.45 for concrete grade 25 and can be concluded that higher percentage of POFA replacement can enhance the acoustic properties of a concrete block but may reduce the strength of the concrete.

1. Introduction

Palm Oil Fuel Ash (POFA) is a kind of agricultural waste produced by the combustion process in steam boiler at the Palm Oil Mill and the waste were not really useful to industry as they contain not enough nutrients and left dumped near the palm oil mill [1]. Palm oil industry is the biggest agricultural industry in Malaysia and it produces approximately 41% of world palm oil production and 47% of world exports as stated by Malaysian Palm Oil Council (MPOC) and for every 100 tons of fresh fruit bunches processed, approximately 52 tons of nut shells, fibers and empty bunches discharged from the mills [2]. Several studies and experiments were conducted to determine the effect of using agricultural waste as cement replacement in concrete [1][2]. POFA will act as replacement to cement in concrete mix these ashes have been precisely studied on its properties and proved that it has cementitious properties which called as pozzolanic materials but the capabilities of the ashes must be examined before being commercialized [1].

As the biggest agricultural industry in Malaysia, palm oil mills produced huge number of waste in solid form [3]. The alternatives to take the benefit of POFA as substitute or replacement for cement in concrete mixture leads to optimize the utilization of oil palm waste and also to produce low cost

