CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

The concrete as the main construction materials in the constructions, as the demands of the concrete increases, the demand of Portland cement and others filler also increases. Concrete is a good common to high compressive strength and low maintenance with long service life compared to other construction material like timber. Steel also one type of construction material used in construction project or infrastructure. Unfortunately, the production of Portland cement and steel also give the serious impact to earth surface environment, it generated by-product such as dust, fly ash, slag, sludge and other similar waste. This waste without proper way to deal with it, directly giving hazards to the environment and human health. To reduce the impacts to the environment, the engineers try to figure out deal with it or reused the by-product as filler to replaced construction materials.

Today, in Malaysia and other countries who still in developing required the great demand of construction materials such as cement, aggregate, timber, steel and similar materials for civil engineering industry, especially for concrete construction and infrastructural. With higher demand of construction materials directly burst the mining, steel, cement and other industries to fulfil with the demand of it. Hence, by-product of the industries either increases, required more space or land to store it or deal with it. Those by-products giving the direct impact to earth environment and human health, without a proper way of disposing it. Used the waste material to produce a useful product has become a great main solution to disposal problems (Hassan Y. Ahmed et al., 2006). With utilize by-product
such as steel slag as filler to replace aggregate for road construction and hydraulic engineering constructions has given the good replacement. (H. Motz et al., 2001). The suitability of the by-product has to be proven by the technical properties with environmental compatibility, depending on the repetitive field that apply (H. Motz, 2001). The application of steel slag use as rail ballast and bridge construction was encouraging. Fully utilized of the by-product able provide a guarantee a caution and efficient use of the natural resources, improves the environment quality and minimized human health (H. Motz, 2001).

Figure 1.1: Production and utilization of natural aggregates and industrial by-product/ co-product in Germany 2001. From the figures show, the utilization of by-product and waste materials was lower, compare to natural aggregates and gravel. Thus, the Germanic countries of the respective industry are concentrated on increasing the utilization rate of industrial by-products and recycling materials. With increasing of the utilization rate of industrial by-product and recycling materials can reduce the production of the natural aggregate and gravel to save more natural resources.

![Graph showing production and utilization of natural aggregates and industrial by-product/ co-product in Germany 2001.](image)

Source: H. Motz (2001)
1.2 PROBLEM STATEMENT

Concrete or cement based masonry basically as the building materials for most domestic or complex construction projects. With advanced technology for today, some of the building was constructed with combined concrete and steel to enhance the strength and durability of the building. Therefore, the demand of steel in the construction fields also almost same with the concrete. At the same time, the problem of the disposing of waste materials such as steel dust, slag, fly ash and other similar things produced by different industries, becoming a major concern since it required more land to keep it and create environmental hazards. With an estimated, more than 100 million tons of mineral waste were being produced and deposited on the earth’s surface by the mining industries. Besides that, wastes the generated by steel industries such as dust, sludge and slag about 20 million tonnes for every year. To overcome the above mentioned problems, steel dust from steel industry used as filler to the construction material. In this study, carried out the experimental work to analyse the effect of steel as filler on cement based masonry by replacing the weight of fine aggregate to determine steel dust can enhance the performance of bricks.

1.3 OBJECTIVES

The research objectives of this study are:

i. To determine workability, compressive strength and porosity of masonry bricks containing steel dust.

ii. To identify the optimum replacement for steel dust to fine aggregate in masonry bricks.

1.4 SCOPE OF STUDY

The waste materials as steel dust the main character in this research as filler in the masonry bricks mix to produce cement based bricks. This study will focus in 5 mix