CHAPTER 3

RESEARCH AND METHODOLOGY

3.1 INTRODUCTION

This chapter is to explore the hypothesis that made earlier by the previous chapter. The main objective during this research is to find the optimum 2D closed loop that can performance as well as hooked end steel fiber for the steel fiber concrete. The fiber dosage that used during the mix is 1% from the quantity of the concrete. The type of fibers that used during this experiment is 2D closed loop fiber (25.4 mm x 25.4 mm) and hooked and steel fiber with 60 mm in length and 0.75 mm in diameter.

3.2 MATERIAL

The main materials that will use in this experiment are Portland composite cement (ASTM type III), fine aggregates, coarse aggregates, and steel fibers. The steel fiber is the extra material to the concrete, yet it does not act as partial cement. The quantity of the steel fiber used is 1% from the amount of concrete that need to be produced. Fine aggregate is come from river sand while the coarse aggregate is form granite. The shape of the steel fibers used in this research is 2D closed loop and hooked end steel fiber. The characteristic of the 2D closed loop fiber is square in shape with 25.4 mm x 25.4 mm, while the hooked end steel fiber is 60 mm in length with 0.75 mm in diameter.
3.2.1 Portland Composite Cement

![Portland cement](image)

**Figure 3.1**: Portland cement

Cement is the mostly used materials in the construction site, thus the most common type of cement is Portland composite cement. Another reason of using Portland composite cement because the quality had been certified by SIRIM of BS 197-1:2000 CEM II/B-M cement. The brand of cement that used during the experiment is YTL ORANG KUAT PORTLAND SIMEN BIASA.
3.2.2 Coarse Aggregate

The most common type of stone that used as coarse aggregates in the construction area is granite. The size of the coarse aggregates should larger than 4.75mm in diameter, however mostly the size will in the range from 9.5mm till 37.5mm in diameter (ACI 221R, 1996).

Sieve analysis is needed before use the coarse aggregates in the mix. This is to ensure that the size of the coarse aggregates is standard to each other, thus according to the CIDB Malaysia the maximum size of the coarse aggregates should not more than 19mm. Through sieve analysis, it can remove the size of the aggregate which is greater than 19mm by using 20mm sieve. Furthermore, the condition of the coarse aggregate should be in the clean and dry before the production of the concrete. Generally, the size of the coarse aggregate should be in round and smooth, this is because rough textures and angular aggregate will need more water during the mix (Salihu, 2011).