CHAPTER 1

INTRODUCTION

1.1 Background of study

Recycle concrete aggregates is a part of environmental considerations that become a common feature in construction industry. Concrete recycling gains importance because it to protect natural resources and eliminates the need for disposal by using the readily available concrete as an aggregate source for new concrete or other application. There are a variety of benefits in recycling concrete rather than dumping it or burying it in a landfill. Aggregate is one of the most vitally important materials in use for concrete production as it profoundly influences concrete properties and performance. According to Khaldoun Rahal (2005) the environmental impact of the production of the raw ingredients of concrete such as cement and coarse and fine aggregates is considerable. The scale of the problem makes it prudent to investigate other sources of raw materials in order to reduce the consumption of energy and available natural resources, and to achieve a more green concrete.

The recycled concrete aggregates can be defined as crushed concrete composed fragment coated with cement mortar from demolition of the old structures or waste cube test that has been processed to produce aggregates suitable for use in new concrete. The processing, as with many natural aggregates, generally involves crushing, grading and washing. The fine aggregate, however, generally contains a considerable amount of old cement paste and mortar. This tends to increase the drying shrinkage and creep properties of the new concrete, as well as leading to problems with unworkable mix and strength.
The ratio of the flexural strengths to the compressive strength is in the range of 16-23% and 9-13%, respectively (Katz, 2003). These values are about 10-15% lower compared to the normal concrete. A study by Rao, shows a reduction in strength of 15-20% to reference concrete at 100% replacement (Rao, 2005). In order to improve the strength of concrete the idea to add fibres to a concrete mixture with recycled aggregate may change material properties of such concrete, improve behaviour and bring about new types of applications. Fibre reinforced concrete with recycled aggregate can be considered as optimal structural concrete for various applications. The approach to design of fibre reinforced concrete with recycled aggregate is defined by this method, or the philosophy, of the design, which is reflected in the composition of fresh concrete, in the case of fibre reinforced concrete this process is its complete opposite. The composition is given in advance and subsequently its properties are proofed and its applicability in building industry.

Natural fibers are prospective reinforcing materials in concrete and their use has been more traditional than technical. The advantages of kenaf fiber reinforced concrete (KFRC) included increasing toughness, enhancing cracking behaviour, enhanced durability and improving fatigue and impact resistance have been well presented in the previous research. Steel, polypropylene and synthetic fibres are the main materials used to control concrete cracks and weak bonds of concrete. As the needed for these materials is becoming higher and their cost is also rapidly increasing. Therefore, there is a need to explore alternative materials to ensure that the price of fibre is within an affordable limit for both small and large scale construction purposes.
1.2 Problem statement

The waste cube concrete which have been tested will be collected from the laboratory storeroom to been thrown out. This will make the laboratory store full of waste cube concrete. The waste cube concrete from concrete laboratory can be used as a recycle concrete aggregate. But, the effect of using recycle aggregates concrete in production of concrete mixture is the quality of recycle aggregate is usually lower than that of natural aggregate due to remaining mortar particle, surface crack, and higher water absorption of recycle concrete aggregate. This will cause negative effects on mechanical properties, air content, workability and durability of fresh concrete. Therefore, addition of fibers to the recycled aggregate concrete will overcome the problems, as the fiber increase compressive, tensile and flexural strength of the concrete (Abdulhadi, M, 2016).

1.3 Objective

This study aims to determine the behaviour of reinforced concrete beam made from combination of steel fiber and kenaf fiber with recycled concrete aggregates. Thus the objectives of this study as follow:

1. To investigate the strength of reinforced concrete beam by replacing natural coarse aggregate with the recycled concrete aggregate.

2. To compare the behaviour of reinforced concrete made up of natural coarse aggregates and recycled concrete aggregates.

3. To study the structural behaviour of steel fiber and kenaf fiber (hybrid fiber), when added it into the reinforced recycled concrete aggregates beam.