INTRODUCTION

1.1 INTRODUCTION

Product design is an approach of creating new product has become increasingly essential to the survival of manufacturers in today’s fast-changing and hypercompetitive environment as reported by (Encyclopedia of Management, 2009). A company may waste their effort, money and time of developing due to wrong design concept. Therefore, it is extremely important to make sure the design is perfect before production.

According to (Maleque and Salit, 2013), there is a direct relationship between material selection and product design. The goal to produce excellent and reliable product only can achieve while both material selection and design fulfil the requirements together. (Jayakody, 2009) has stated that the integrity of a product design can be determined only after complete a systematic material selection procedure. Otherwise, the result it is highly susceptible for failures. A successful product tend to reduce the development cost, offer competitive advantages in the marketplace and also bring profit to the company.

In today’s growing automotive industry, every car manufacturers strive to invent new products or enhance existing products for efficient fuel consumption, safety and comfort. (Pishdad, 2012) has mentioned that brake calliper, being an essential part of brake system to decelerate or stop a vehicle. Brake calliper is act as a U-shaped
housing that wraps around the brake rotor and is mostly made of cast iron. (Sergent et al., 2014) have highlighted that a successful brake calliper design must be light and stiff to prevent excessive deformation and extended brake pedal travel.

Metal Matric Composite (MMC) are mostly used automotive industry due to their significant improved properties including high specific strength and stiffness, temperature resistance, low thermal expansion coefficient, wear resistance and light weight which appear to offer more advantages over traditional cast iron, as has been proven (Macke et al., 2012).

According to (Encyclopedia of Management, 2009), Quality function deployment (QFD) is being used by company to transform the voice of customer into functional requirements for a product or service to satisfy the customers. QFD is a structured approach that adopt the seven management and planning tools to identify and prioritize customer's expectations quickly and effectively. The House of Quality is a basic design tool of the management method. The foundation of the house of quality is the belief that a product should be designed to reflect customer’s desires and tastes. Through this framework, people facing different problems and responsibilities can discuss various design priorities.

1.2 PROBLEM STATEMENT

The current problem of existing brake callipers are made from cast iron which possess heavy weight result in high fuel consumption as has been highlighted by (Pishdad, 2012). As (Sergent et al., 2013) carried out their study, deflection during clamping action is the major problem of a brake calliper, thus will influence the comfortableness of a driver to press brake pedal since more additional braking fluids volume required to compensate the deflection and also safety of the vehicle. Therefore, a successful floating brake calliper design should be light weight, high stiffness and strength to prevent deflection.
1.3 OBJECTIVE OF THE RESEARCH

The primary goal of this project is to select the best design of a Metal Matrix Composite (MMC) brake calliper design. The following are the objectives that have to meet in this research:

i. To compare selected MMC material with conventional brake calliper.
ii. To define and rank the design parameters of brake calliper.
iii. To propose few alternative designs of floating brake calliper and analyse the performance of brake calliper designs based on design parameters.
iv. To evaluate and rank the best brake calliper design based on product performance.

1.4 SIGNIFICANT OF THE RESEARCH

This research emphasize on both material selection and design selection in floating brake caliper design. The significances of this research are:

i. Better understanding of the function of automotive floating brake calliper.
ii. Define the desired design parameters of brake callipers.
iii. Comparison of the performance of proposed conceptual designs of brake calliper based on important design selection parameters.
iv. Select the best design of brake calliper concept among design alternatives.