1.1 INTRODUCTION

Nowadays, in the era of globalization, design for manufacture and assembly (DFMA) is fairly important, according to the current issue of price increases for consumer goods. In addition, the term DFMA accompanied by a combination of Design for Assembly (DFA) and design for manufacturing (DFM). The basic concept is that design engineers apply DFMA paradigm of software to analyse manufacturing and assembly problems at the initial design stage. In this way, all considerations about the factors that affect the final output as early as possible in the design cycle. Additional time is spent in the initial design stage is relatively less time will be spent on a redesign of repetitions and meanwhile, costs will be reduced.

DFA methods are considered and solve the problems as possible in the assembly process at the initial design stage can ensure parts will be fitted will be faster, lower cost and productivity. DFA method is similar to the paradigm of design, engineers are using all kinds of methods such as analysing, estimating, planning and simulation takes into account all the factors that will affect the installation process during the entire design process; construction revise assembled to meet the features and functionality of the final product and at the same time, to reduce costs as much as possible.
The purpose of the design for assembly (DFA) is to facilitate the assembly product that costs are reduced. Nevertheless, as a result of applying DFA usually include improved quality and reliability, and a reduction in the production of equipment and parts inventory. The secondary benefits often greater than the reduction in assembly costs. In addition, to reduce the number of parts or counts, variability, assembly surface, simplifies of the assembly sequence, components handling and insertion, for quicker and more reliable assembly. Furthermore, it is also to reduce the total of material costs, simplifying the selection of vendors, reducing labour and assembly, simplifies the assembly process and factory layout.

This study concentrated on re-design of a product with the Boothroyd Dewhurst DFA approach. The method utilized, as it gives a process of improving a product design for easy and low cost assembly. Moreover, it additionally concentrates on the capacity and assemblability simultaneously. Besides that, the Boothroyd Dewhurst DFA method, it analyses whether the part can be considered as a candidate for elimination or mixed with other parts in the assembly.

1.2 OBJECTIVE

The main objective of this project:

- To analyse the efficiency of product design in the aspect of the assembly.
- To improve product design by DFA methodology for reduce the assembly time and manufacturing cost by redefines the component design.
1.3 SCOPE OF RESEARCH

This research, heavy duty staple gun TR110 as the product. By using the Boothroyd Dewhurst Design for assembly approach: a) Exploded view of the product and using CATIA V5 software as modelling, design the original product, b) Then, analyse the parts using DFA software for analysis original product and new design, c) Compare the result between original product and new development product, d) Using a fused deposition machine to produce a physical object of re-design using Rapid Prototyping process.

1.4 PROBLEM STATEMENT

A heavy duty staple gun is a manual handheld machine used to drive heavy metal staples into plastic, wood, or stone. It also used for different applications and to affix a variety of the materials, including wiring, insulation, roofing, house wrap, carpeting, craft materials and etc. However, in the era of globalization, product manufacturer need to be able to respond quickly to market demand and has shorter product development time to market their products in order to compute and winner in the global market. Today, a mostly product currently includes many of fasteners and unnecessary feature. Therefore, it leads to the increasing of time during assembly activities which later extend the time to introduce the product to the market. Late availability on the market will cause the design to be outdated and loss of competency.

As a conclusion, one of the methods in design for assembly (DFA) which known as Boothroyd Dewhurst can be utilized to overcome the problem. There are a few ways to enhance the design, which is; a) The great way possible to assembly the product by eliminating of fasteners to another kind assembly, such as press fit, snap fit, mechanical fastening and etc., b) Combine the part or eliminated the unnecessary part. By using this method, it was capable of assembly time saving; higher product quality and more products can be produced. Other than that, it likewise evaluated the design efficiency of the product and the product cost of assembling in the early stages of the design, designers could always estimate the efficiency and labour costs of their designs before the product produced. This research is aimed to enhance terms of