CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

This chapter will discuss on the methods and parameters used in carrying out this research. Basically, this research was conducted to determine either the honeycomb based structure is able to be fabricate by using low cost in-house thermoforming equipment. This chapter will discuss on the designing of the experiment process, the analysis preparation which include the mould design and fabrication process, the selection of raw material, the process involve as well as the parameter, the machine selection and its parameter, the forming process that will be use in product fabrication and how the experimental process will be done.
Figure 3.1: Methodology flowchart

Figure 3.1 show the overall process or method to complete this project. The methodology kicks off with design process followed by material selection and mould fabrication. Next, thermoforming process will take place to obtain the honeycomb based structures. The structure then undergoes honeycomb structure formation and compression test is use to check the structural strength of the prototype.
3.2 DESIGN PROCESS

The thermoforming process is a plastic formation process which includes a sheet of plastic and forming it over a male or female mould. The basic thermoforming process involved with clamping, heating, shaping, cooling and trimming. Thermoforming process can be achieved through the pressure forming, vacuum forming or twin sheet processing.

The few stages involved in the vacuum forming process. Firstly, the mould is made from aluminium material with the shape of Honeycomb based structure. Next, the mould shape placed in vacuum former. After that, a sheet of polymer is clamped in the position above the mould. Next, the polymer sheet heated and sealed to the mould and the vacuum is turned on and pumps out all the air. At this stage the shape of mould can be clearly seen through the plastic sheet.

The plastic has cooled and ready to be remove the vacuum pumps switch off. After that, the plastic sheet removed from the vacuum part and the sheet has the shape as mould shape. Lastly, the excess plastic is trimmed so that the plastic container remains.

3.2.1 SELECTION OF MOULD TYPE

Basically mould can be divided into three types which are male mould, female mould and combine mould. The selection of the mould is depends on the process that we are going to choose and the product that we are going to produce. Each mould had its own limitation.

Parts produce by using male mould have a tendency to have more noteworthy draft angles, heavier base and corner with more slender edges, while the material copy the geometry of mould surface. Parts produce by using female mould have a tendency to have more modest draft edge, more slender base and corners and significant edges with the outer surface of the product copied the inner shape of the moulds. Pre-stretching,