CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

This chapter discuss on method and parameter used for preparation and fabrication of thermoplastic container. In this methodology process, there were few stages that have been involved to complete this thermoplastic container. This process started with designing the mould for the container using Catia V5 software, followed by fabricated the moulds from aluminium block using CNC milling machine, drill the vent holes for the vacuum forming applied, and form the container using polypropylene sheet material. The flowchart of this experiment that was carries out in this study is shown in Figure 3.1
Thermoforming process parameters:
- Temperature used: (160 °C, 170 °C, 180 °C, 190 °C, 200 °C)
- Vacuum air pressure: 20 (Kpa).
3.2 RAW MATERIAL

There were two types of material used in this process of preparation thermoplastic container. First, the material used for fabricating the container mould was aluminium. Second, the thermoplastic material used for fabricating container was polypropylene sheet.

For the fabrication of mould, aluminium was choosing because it has temperature control lines running through them and able to regulate the heat of the thermoplastic being formed. Based on previous study, wood, plastic and also epoxy were used as a mould but these all materials not temperature controlled mould. In the recent study, aluminium and other metal type material was chosen for thermoforming moulds because of its properties. There were few benefits of using aluminium as a thermoforming mould, such as, machine ability and high thermal conductivity. In a few research, high production thermoforming mould used were made of aluminium because aluminium moulds contain channels through which water, the primary cooling medium was pumped. The cooling rate and the temperature controlled. The temperature and cooling rate were also the reason of shrinkage and other attributes of thermoforming part. The aluminium block was shown in figure 3.2.

![Figure 3.2: The aluminium block](image)

The polypropylene as the thermoplastic material used for the container in thermoforming process. The advantages of polypropylene grades include quality of sheet, the wall thickness and uniformity part, dimensional stability and also regrind used. The thickness of plastic sheet should be less than the diameter of vent holes. The PP sheet used in this