CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Polypropylene is in a category of thermoplastic polymer resin. The molecular formula is \( \text{C}_3\text{H}_6 \). It is a part of both the average household and is in commercial and industrial applications. Commonly, product made of polypropylene can be used in various operations including as a structural plastic or as a fiber-type plastic. This plastic is regularly used for food containers because it needs to be dishwasher safe. PP also does not contain BPA which is not a secure choice for food packaging since this chemical has been shown to leach into the food products. It has been linked to numerous health problems, especially in children.

Compared to other thermoplastics, the melting point of polypropylene is very high which is at 160°C. Dishware made from this type of thermoplastic unable to sear when high temperature of water used when washing acted on it. Unlike with the popular polyethylene plastic container which has a much lower melting point. This type of thermoplastic is also very easy to add coloring agent, and it is often used as a fiber in carpeting that needs to be rugged and durable, such as that on futsal courts or in mini garden. Unlike nylon, polypropylene is an ideal selection used as a fiber for rugged carpeting because it doesn’t soak up water and suitable with moisture condition.
Polypropylene (PP) sheet is suitable to be form with the thermoforming process rather than other process. The thermoforming can be defined as a process of heating and form plastic sheet until it become malleable into a desired shape in a mould under pressure and temperature. Lately, it is higher growing process in the industry due to its economic advantages and the improvement of the process variable although thermoforming use less technique to produce plastic objects. The techniques include the clamping, heating, shaping, cooling and trimming of unwanted or excess parts.

1.2 PROBLEM STATEMENT

Firstly, thermoforming polypropylene (PP) plastic container requires more attention to mould design. Besides, ideal temperature is important to produce functional thermoplastic container using polypropylene (PP) sheet with thickness of 1 mm. Although the thermoforming process has been developed for over two decades but there are still some unsolved problems found in this technology. In the development commercial polypropylene grades, there are several critical problems addressed such as sheet quality, part uniformity and wall thickness, regrind use and dimensional stability. In this project, thermoforming temperature will be the main parameter used to investigate the effect to the final product, which is plastic container

1.3 PROJECT OBJECTIVE

i. To design and fabricate plastic container using polypropylene (PP) sheet with thickness 1 mm via thermoforming process.

ii. To study the effect of thermoforming temperature and number of mould vent hole to 1 mm PP sheet

iii. To investigate the hardness property on the fabricated polypropylene plastic container
1.4 SCOPE OF THE PROJECT

This project needs someone to design and fabricate functional thermoplastic container using polypropylene (PP) sheet with thickness 1 mm via thermoforming process. This project starts with searching various types of journal that related to the topic. Read and understand all the journals is the element in the effort to make this project. Design consideration for the plastic product and its mould important as well as can help reduce the defect. Thermoforming process with ideal temperature will be investigated in this project. This study will focus on suitable thermoforming methods for polypropylene (PP) and types of design to be used. Performing physical test and hardness test on the plastic container needed as to verify the result whether it is valid, reproducible and unquestionable.