CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

In order to achieve the aim and objectives of this project, there are several method uses. The sequence of the methods has been planned as shown in figure 3.1. The method consists of design cylindrical cup and several calculation, define mechanical properties, simulation process, comparison with experimental result. The finite element simulation is performed in HYPERFORM software. Analysis of deep drawing process is based on variables thickness and height of product in order to meet the optimization of blank holder force.

3.2 FLOW PROCESS

Process planning is important in order to make sure this project is completed on time. It also to ensure that all the tasks will run systematically. Based on the literature review from the journals and book, the simulation of cylindrical cup are developed.
Figure 3.1: Process planning flow chart
3.3 PARAMETER SELECTION

The formability of blank sheet during deep drawing operation depends on the process parameters such as blank holder force, punch force and blank thickness. Hence, using proper process parameters are essential to predict the wrinkling. Figure 3.1 shows the parameters selection with the value. The value have calculated using formula in literature review.

Blank holder calculation:

\[ F_N = \frac{\pi}{4} \left( 105^2 - 47.8^2 \right) \left[ (2.196 - 1)^2 + \frac{47.8}{200} \right] \frac{320}{400} \]

\[ = (6.86 \times 10^3)(1.43+0.239)(0.8) \]

\[ = 9159.47 \text{ N} \]

\[ = 0.916 \text{ ton} \]

Table 3.1: Value of parameters

<table>
<thead>
<tr>
<th>PARAMETERS</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blank Thickness</td>
<td>1 mm</td>
</tr>
<tr>
<td>Blank Holder Force</td>
<td>0.916 ton</td>
</tr>
</tbody>
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