



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**DESIGN AND ANALYSIS OF THE OPTIMUM GATE SIZE FOR
MULTI-CAVITY PLASTIC NAME CARD INJECTION
MOULD**

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering (Manufacturing Design) (Hons.)

by

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BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: DESIGN AND ANALYSIS OF THE OPTIMUM GATE SIZE FOR MULTI-CAVITY PLASTIC NAME CARD INJECTION MOLDING

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I hereby, declared this report entitled “Design and Analysis of the Optimum Gate Size for Multi-Cavity Plastic Name Card Injection Mould” is the results of my own research except as cited in references.

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Date : 5 June 2015

APPROVAL

This report is submitted to the Faculty of Manufacturing Engineering of UTeM as a partial fulfilment of the requirements for the degree of Bachelor of Manufacturing Engineering (Manufacturing Design) (Hons.). The member of the supervisory committee is as follow:

.....

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ABSTRAK

Projek akhir ini adalah “Mereka-bentuk dan Menganalisa bagi menentukan saiz get yang optima untuk acuan”. Projek ini memfokuskan kepada mereka bentuk saiz get (untuk acuan dua-rongga), menganalisa saiz get yang optima dan bahan yang sesuai untuk optima saiz get yang terpilih. Reka bentuk Pemegang Kad Nama Plastik dan beberapa saiz get yang berbeza telah direkabentuk menggunakan perisian CATIA V5R19. Perisian Simulasi Moldflow Adviser adalah perisian yang digunakan untuk menganalisa saiz get yang optima bagi acuan dua-rongga Pemegang Kad Nama Plastik. Bahan yang digunakan untuk menganalisa acuan Pemegang Kad Nama Plastik adalah berbeza seperti Polipropilena, Polietilena, Akrlonitril-Butadiena Stirena dan Polietilena Ketumpatan TInggi. Bermula dari menganalisa saiz get yang berbeza menggunakan perisian Simulasi Moldflow Adviser bagi reka-bentuk sedia ada. Kemudian, saiz get yang optima dan bahan yang sesuai adalah ditentukan berdasarkan analisa yang dibuat menggunakan perisian Simulasi Moldflow Adviser.

ABSTRACT

This final year project is about “Design and Analysis of the Optimum Gate Size for Multi-Cavity Plastic Name Card Injection Mould”. This project is focused on the design of the gate size dimension (for two-cavity), analysis of the optimum gate size and suitable material for the selected optimum gate size dimension. The design of the Plastic Name Card Holder and the several of the gate size dimension were designed using CATIA V5R19 software. The Simulation Moldflow Adviser (SMA) software are used to analyse the optimum gate size for the two multi-cavity Plastic Name Card Holder. Material used for analysing the Plastic Name Card optimum gate size are Polypropylene (PP), Polycarbonate (PC), Polyethylene (PE), Acrylonitrile-butadiene-styrene (ABS) and High-Density Polyethylene (HDPE). For the start with analysing the suggested of several dimension of the gate size by using SMA software of existing design. Then, the optimum gate size dimension and the suitable material are determine according to the SMA analysis.

DEDICATION

All the hard work is only for you:

Abdullah bin Salleh

Siti Fatimah binti Hassan

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

| | | |
|--------|---|---------------------------------------|
| PE | - | Polyethylene |
| PP | - | Polypropylene |
| PC | - | Polycarbonate |
| ABS | - | Acrylonitrile butadiene styrene |
| DFM | - | Design for Manufacturing |
| CA | - | Cellulose acetate |
| CAP | - | Cellulose acetate propionate |
| PS | - | Polystyrene |
| PAS | - | Impact-resistance polystyrene |
| PA 6.6 | - | Polyamide 6.6 |
| LDPE | - | Low density polyethylene |
| HDPE | - | High density polyethylene |
| PMMA | - | Polymethyl methacrylate |
| MABS | - | Methyl methacrylate-butadiene-styrene |
| PVC | - | Polyvinylchloride |
| SAN | - | Styrene-acrylonitrile |
| PTFE | - | Polytetrafluoroethylene |
| PET | - | Polyethylene terephthalate |
| PBT | - | Polybutylene terephthalate |

| | | |
|------|---|--|
| PEEK | - | Polyether ether ketone |
| PAI | - | Polyamide-imide |
| UV | - | Ultra violet |
| EVA | - | Ethylene-vinyl acetate |
| ISO | - | International Organization for Standardization |
| PSM | - | Projek Sarjana Muda |
| 3D | - | 3 Dimensional |
| SMA | - | Simulation Moldflow Adviser |

CHAPTER 1

INTRODUCTION

This report consist of the literature review and the methodology for the research project. In this chapter, it consist of the problem statement obtain by preliminary study of the literature review. The objective is determine from the problem statement. The scope will only focused on what has been stated and discussed.

1.1 Project Overview

In the injection molding process, many factors can affect the molding process and the final quality of the products. The method of traditional mold design is relied on the mold designer's experiences. With the help of analysis software, the designers can reduce the cost of mold to be discovered called Heuristic loops and shorten the development cycle. By this, it is automatically solve the production problem on material property, product design and mold design. The process of time cycle in injection molding are very dependent on the product produce and other three parameters which include temperature, speed and pressure. With a slight difference in these three parameters, the product produce may be not in a good conditions. Gate is also included in the factor of the most important parameter in injection molding. Without a proper selection of gate design, it really can influenced the manners of the plastics flow in the injection molding. The selection of gate size become most vitals variable to improve the part quality to reduce the rejection and also elimination in trial and error method.

1.2 Problem statement

Parameter settings and feeding system such as gate, runner and sprue inside the plastic injection mould are located by mould makers by Heuristic method. In this situation, people that have experiences in injection molding process will be capable to decide the size of gating and feeding location of products. The problems occurs when they do not have any parameter or references to be guides in order to make the product being produce without any defect in the selected parameter. When the gating size of the mold is not proper, this can cause defect of the product being produce. This will result the waste in time and loss in money.

One of the solution of this problem is by using the simulation software which is available in the market. This simulation can forecast the plastics properties that flow into the mold. It is one of the most appreciate software because engineers can obtained the statistical data before the actual mold are being produce. Moreover, the result obtained help the designer of mold makers select the right dimension of sprue, gate and runner and indirectly these can save the economical and using less trial and error method.

1.3 Objectives

The main objectives of this research is:

- i) To identify the optimum gate size in multi-cavity plastic name card holder injection mould (two-cavity).
- ii) To find the best material according to the given parameters.