

DESIGN OPTIMIZATION FOR AUTOMOTIVE WIPER RETRACTOR SYSTEM

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APPROVAL

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This report is submitted in partial fulfillment of the requirement for the Bachelor of
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DECLARATION

I hereby, declare this thesis entitled “ DESIGN OPTIMIZATION FOR AUTOMOTIVE WIPER RETRACTOR SYSTEM” is the results of my own research except as cited in the reference.

Signature :

Author's name :

Date :

For my beloved father mother

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I would like to take this opportunity to thank my supervisor, Mr. Mohd Zakaria bin Mohd Nasir whose help, stimulating suggestions as well as encourage me throughout the completion of the project.

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Lastly, I would like to wish that this kind of support could lasts in the future so that the objective of Final Year Project can be achieved, thus would help the Universiti Teknikal Malaysia Melaka stands strong among the best university in the world.

ABSTRAK

Projek Sarjana Muda tahun akhir yang dilaksanakan ini adalah mengenai penghasilan sistem penginjal pengelap cermin kereta secara automatik. Ia dilakukan dengan menyelidik sistem mekanikal pengelap kereta serta keperluan di dalam merekabentuk alat penginjal pengelap cermin kereta. Dari analisis yang dilakukan, beberapa konsep akan dihasilkan dan konsep yang terbaik akan dipilih bagi menjalani proses yang seterusnya. Setelah konsep yang terbaik telah dipilih, proses rekabentuk yang lebih terperinci akan dilaksanakan. Beberapa analisis akan dibuat bagi memastikan keupayaan rekabentuk tersebut. Hasil keputusan tersebut akan menentukan samada rekabentuk yang dihasilkan boleh dilaksanakan atau tidak. Setelah melalui proses analisis, langkah seterusnya adalah penghasilan model rekabentuk tadi. Dari spesifikasi rekabentuk yang telah ditetapkan, lukisan 3 dimensi akan dihasilkan menggunakan perisian SolidWorks. Lukisan ini akan ditukar kepada prototaip menggunakan mesin prototaip. Akhir sekali, kesimpulan berkaitan dengan projek ini dihasilkan berdasarkan apa yang telah dilakukan sepanjang proses menyiapkan projek ini. Beberapa cadangan berkaitan dengan projek ini dibuat bagi menambahbaik rekabentuk mesin penginjal pengelap cermin kereta pada masa hadapan.

ABSTRACT

The final year project is about designing and developing an automatic wiper retractor system. It is done by studying the wiper mechanical system as well as the requirements in designing the automated wiper retractor device. From the study, several concepts will be generated and the best concept will be selected for further process. As the concept had been finalized, the detail design process is done. Some analysis will be done in order to validate the design. The result of the analysis will determine either the design is applicable to be used or not. When the design had gone through all the analysis, the next step which is fabricating process can be preceded. From the design specification, 3 dimensional sketches are done using SolidWorks software. The sketch then will be converted into a prototype using the rapid prototyping machine. Lastly, the conclusion is done as it summarizes the project thoroughly based on what has been done throughout the whole process of finishing the project. Some suggestion regarding the project is given as to improve the design in the future,

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LIST OF SYMBOL

FEA	=	Finite Element Analysis
UV	=	Ultraviolet
DC	=	Direct current
SPDT	=	Single pole, Double Throw
DPDT	=	Double Pole Double Throw
SPST	=	Single Pole, Single Throw
DPDT	=	Double Pole Double Through
COM	=	Common
NC	=	Normally Closed
NO	=	Normally Open
IC	=	Integrated Circuits
K	=	Kilo
DIP	=	Dual-in-line package
DIS	=	Discharge
FDM	=	Fused Deposition Modeling
CAD	=	Computer Aided Drawing
CAE	=	Computer-aided engineering
ABS	=	Acrylonitrile-Butadienestyrene

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CHAPTER 1

INTRODUCTION

A wiper is a necessity tool for a vehicle to have because it is used for clearing any obstacle on the windscreen includes dirt, rain drop, and snow and etc. It is widely used in automotive segment such as cars, buses, trains, locomotives, ships and aircraft. The main idea of this project is to design a device which will take care of the wiper rubber as well as the windscreen by lifting the wiper upwards to avoid the contacts between the windscreen and the wiper rubber.

1.1 Objective

This project's objective is to study and analysis the wiper linkage system and design the wiper retractor in order to improve the usage of the wiper and extend the lifetime of the wiper blade. This wiper retractor system also does the wiper lifting process more systematically and automatically.

1.2 Scope

- i. Literature study on mechanical system for locking device, wiper, lighting system
- ii. Optimization current design/ design concept
- iii. Modeling in SolidWorks for components
- iv. Testing simulation by using FEA software; CosmosWorks
- v. Perform analytical study on critical components
- vi. Fabricate product as rapid prototyping

1.3 Problem Statement

The idea of developing the device is to fix as well as to improve the problem regarding the windscreen wiper. The problem that occurs regarding the wipers; the rubber of the wiper are decoying due to the contact with the windshield. The heat from the sunlight will increase the capability of decoying process of the wiper rubber as it deflects the heat to the wiper. The result of this process will affect not only to the rubber itself but also to the windscreen. The sticky rubber will leave a stain on the windshield and it will create a blurry view for the driver. In order to avoid it, usually the drivers need to lift the wiper up manually. Not all the times the driver will do it as the process of lifting it up is quite troublesome plus in a certain condition such as raining will prevent the driver to do it.

As for designing the wiper retractor device, there are some constraints that need to be considered. The constraints are:

- i. Minimal space available for the wiper retractor device
- ii. The retractor must have enough force to lift up the wiper
- iii. The design must have the ergonomics characteristics which means the appearance must fulfill the human needs and it must no blocked the driver's view
- iv. The retractor must operate well according the system requirements

Based on the constraints above, the designed wiper retractor must improve the usage of wiper as well as the way to lift the wiper upwards.

1.4 Content Overview

The first chapter which is the introduction will cover the problem statement, scope as well as the objective of the project. Chapter two is about the literature review of the project. It covers the analysis of the past research which link to the project development. The third chapter refers to the methodology. It tells the viewers how the analysis and project is done either by theoretical procedure or experimental method. The next chapter explains and discusses the results of the project. The analyzed data will be presented and the result will be interpreted. As the final result obtained and been decided, the discussion regarding the topic will be done. This discussion process is described in the fifth chapter. It discusses the result of the analysis by stressing on the importance and implication of the achieved results. The last chapter or sixth chapter is the conclusion and recommendation. It summarizes the project entirely which comprises the methodology, results, result, the outcome as well as the suggestion for the future plan.