DESIGN AND DEVELOPMENT OF FRICTIONLESS AUTOMOTIVE TRANSMISSION: POWER TRANSMISSION ANALYSIS WITH VARIABLE SPEED MOTOR

DIN IQBAL BIN MAHAR AFANDI
2005729513

A report submitted in partial fulfillment of the requirement for the award of the degree of Bachelor of Engineering (Hons) Mechanical

Faculty of Mechanical Engineering
Universiti Teknologi MARA
Malaysia

MAY 2009
ACKNOWLEDGEMENT

The successful completion would be impossible without the assistance and guidance of many individuals who have provided invaluable help to me directly and indirectly throughout my whole project. I would like to express my gratitude to every individual who has contributed to this project.

I would like to thank my advisor, Mr. Ramzyzan bin Ramly who has provided guidance and advice to my research. His endless support and invaluable critics have helped me a lot in this project. I would also like to thank the staffs from industries that have provided a lot of assistance to my project, and also my group member Mr Rahizal Ranom for been such great team mates.

I would like to thank to all of the staffs in Faculty of Mechanical Engineering who have cooperated with me during the project. Special thanks to Mr. Johari, Mr. Helmi, Mr. Mohamad Faiz, Mohd Hazrif and person from the various parties who have contributed tremendously to my project. I would also like to thank the staffs from industries that have provided a lot of assistance to my project.

Finally, I would like to thank my parents for their love and support. I would like to thank my friends who have helped me directly or indirectly in the project.
ABSTRACT

The rapid growth in automotive industry has been widely spread worldwide. The strong competitions among the manufacturer become more competitive and aggressive due to the demand nowadays. Furthermore, the high expectation from the consumers who demands the better engine performance, urban exterior shape, efficient fuel consumption, better interior design and effective cost has created the tough challenges to all the manufacturer in order to attain the standard. As the result, all the aspect in designing a car must be analyzed and observed deeply to ensure the requirement has been fulfilled. In this project, the main focus is on the fuel economy and also the aspect of the transmission system efficiency. This system offer more option in term of flexibility. Nevertheless, to attempt in the improvement of the fuel efficiency the introduction of the torque converters has been implementing. Also in the higher gear ratios it will eliminate the power loss. However in this project, the use of torque converters is dismissed. The focus is on the new concept of the automatic transmission where the mass of the cam will generate the torque that will be converting to the power at the output section. As the result, the weight and balance element plays the major key role in order to ensure the system works smoothly and efficiently. Based on the literature review, observations and study from the previous project there are several problems has been occur such as excessive vibration, insufficient bearing tolerance, high friction, misjudgment in the measurement element and excessive weight for some parts. In order to cater all these difficulty there are some changing elements and method will be apply. Fabrications are necessary for all most part except the gears, bearings and pulleys. Hence, several recommendations have been propose to ensure the system works smoothly and efficiently such as the changing in measurement in some parts and the introduction of the new method for the system. The new idea for the design has been develop in order to accomplish the goals of the project. Furthermore, the introduction of the 1st and 2nd inner plate with new thickness and also the new bearing diameter will ensure the system give the more balance and smooth power transmit.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>TITLE PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DECLARATION</td>
<td>I</td>
</tr>
<tr>
<td>DEDICATION</td>
<td>IV</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENT</td>
<td>V</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>VI</td>
</tr>
<tr>
<td>TABLE OF CONTENTS</td>
<td>VII</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>X</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>XI</td>
</tr>
</tbody>
</table>

## I. INTRODUCTION

1.1 Background Study 1
1.2 Objectives 3
1.3 Problem Statement 3
1.4 Scope of Project 4
1.5 Significance of Project 4
1.6 Project Overview 4
II LITERATURE STUDY

2.1 Basic Principle of Automotive transmission 10

2.2 Infinite Variable Transmission (IVT) 11
   2.2.1 Introduction to IV T 11
   2.2.2 Infinite Variable Transmission Benefits 11

2.3 Continuous Variable Transmission (CVT) 12
   2.2.1 Introduction to CV T 12
   2.2.2 Continuous Variable Transmission Benefits 13

2.4 Automotive Power Transmission 14
   2.4.1 The Basic 14
   2.4.2 Efficiency Analysis 15
   2.4.3 Electric Motor Mode 15
   2.4.4 Transmission Mode 16

2.5 Instrument / Measurement Device 17
   2.5.1 Digital Weight Scale 17
   2.6.1 Digital Tachometer 18

III RESEARCH METHODOLOGY

3.1 Design 20
   3.1.1 Previous Design 20
   3.1.2 Concept / Latest Design 21

3.2 Machine 22
   3.2.1 Milling Machine 22
   3.2.2 Lathe Machine 23
   3.2.3 EM Wire Cut 24