"I hereby declare that I have read this thesis and in my opinion this thesis is sufficient in terms of scope and quality for the award of the degree of Bachelor Mechanical Engineering (Thermal Fluid)"

Signature : .....

Name of supervisor : KOTHWAL ABDUL RAHEEM

Date : 30/5/06

STUDY AND THEORETICAL INVESTIGATION OF VARIABLE GEOMETRY TURBO CHARGER (VGT) FOR LOWER EMISSIONS AND IMPROVED CHARACTERISTIC AND EFFICIENCY

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May 2006

"I hereby declared that this thesis is my own work except the ideas and summaries which I have clarified their sources"

Signature : .....

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Specially dedicated to my family, beloved, friends and companion..

.....

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Specially dedicated to my beloved parents, Mr. Paramasiban & Mrs Suppu Lechmee for their guidance that they showed to me, the comments and suggestions over the pat few years. Without them, who am i.....

To my supervisor Mr.Kothwal, for giving me ample guidance and for always making time for me each time I needed help. To my batch mate and class mate of Kutkm. With the shared and effort from them, this thesis could not be completed on time.

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ABSTRACT

This project is carried out about the "Study and Theoretical Investigation of Variable Geometry Turbo Charger (VGT) for Lower Emissions and Improved Characteristic and Efficiency". The main purpose of this project is to research about turbo charger and study theoretically about turbo charger. The other purpose is to find out the lower emissions and improved characteristic and efficiency of the Turbo Charger. There a many type of turbo charger in market but there are only few is use in Malaysia legally.

ABSTRAK

Kajian projek ini meliputi kepada memahami serte mengkaji mengenai " Turbo Charger"secara terperinci. Dimana melalui projek ini juga, kita dapat mengkaji mengenai perbezaan geometri pada " Turbo Charger". Dengan mengunakan formula-formula serta pengiraan secara teori, masalah-masalah pada reka bentuk pada " Turbo Charger"dapat ditentukan serta dapat mencari cara penyelesaian yang terbaik. Dengan kaedah ini, kecekapan pada " Turbo Charger" dapat ditingkatkan. Melalui kertas kerja ini juga, ciri-ciri " Turbo Charger"juga dapat diperbaiki. Terdapat pelbagai jenis " Turbo Charger" di pasaran tempatan, dimana segelintir sahaja digunakan secara sah.

TABLE OF CONTENT

CHAPTER 6 TURBO CHARGER TROUBLESHOOTING

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 Overview

A turbo charger is a device that uses exhaust gasses produced by the engine to blow air back into the engine. The additional air is supplemented with fuel by the ECU (engine control unit). This causes the engine to produce much more power since it is being supplied with more air and fuel than it possibly could without it. A naturally aspirated engine (non-turbo, standard engine), or "N/A" engine, has to "suck" air through the intake manifolds, throttle body, air filter, etc. With this setup, the most air pressure that can enter the combustion chamber of the engine is a bit less than the current atmospheric pressure. With the turbo, air is being blown into the chamber with positive pressure so that much more air and fuel can enter. A typical turbo charged engine will generate 7 to 10 psi of maximum positive pressure, or "boost". The turbo charger, or "turbo", is mounted directly to the exhaust manifold, where exhaust gasses pass over a turbine impeller that is attached to a short shaft. On the other side of this shaft is a compressor turbine, which pulls outside air in through the air filter and blows it into the intake manifold. So basically, the energy from the expelled exhaust gasses, which would normally be wasted on a N/A engine, is being used to pump air back into the engine

1.2 Problem Statement

Turbo Charger is wisely used in all over the world. Turbo Charger manufacturer in different pattern and weight, but the manufacturer could not find the problem inside the Turbo Charger. If the engine does not operate properly, one should not assume that the turbocharger is the cause of failure. It often happens that fully functioning turbochargers are replaced even though the failure does not lie here, but with the engine.

1.3 Objectives of Project

This project concerned with study and research of turbo charger by investigate and by theoretically. The objectives of the project are as following:

- To study and understand Turbo Charger.
- To improved characteristic and efficiency.

1.4 Scopes and limitation of the Project

There are some scopes and limitations of the study. There are consists of:

- Study the types of Turbo Charger.
- Study the energy produces by Turbo Charger.
- Study the fundamental Turbo Charger.
- Study the different between Turbo Charger and Super Charger.

1.5 Literature Review

A turbo charger is basically a device that uses exhaust gasses produced by the engine to blow air back into the engine. The additional air is supplemented with fuel by the ECU (engine control unit). This causes the engine to produce much more power since it is being supplied with more air and fuel than it possibly could without it. A naturally aspirated engine (non-turbo, standard engine), or "N/A" engine, has to "suck" air through the intake manifolds, throttle body, air filter, etc. With this setup, the most air pressure that can enter the combustion chamber of the engine is a bit less than the current atmospheric pressure. With the turbo, air is being blown into the chamber with positive pressure so that much more air and fuel can enter. A typical turbo charged engine will generate 7 to 10 psi of maximum positive pressure, or "boost". The turbo charger, or "turbo", is mounted directly to the exhaust manifold, where exhaust gasses pass over a turbine impeller that is attached to a short shaft. On the other side of this shaft is a compressor turbine, which pulls outside air in through the air filter and blows it into the intake manifold. So the energy from the expelled exhaust gasses, which would normally be wasted on a engine, is being used to pump air back into the engine.

To better understand the technique of turbo charging, it is useful to be familiar with the internal combustion engine's principles of operation. Today, most passenger car and commercial diesel engines are four-stroke piston engines controlled by intake and exhaust valves. One operating cycle consists of four strokes during two complete revolutions of the crankshaft.

Turbochargers are a type of forced induction system. They compress the air flowing into the engine. The advantage of compressing the air is that it lets the engine squeeze more air into a cylinder, and more air means that more fuel can be added. Therefore, you get more power from each explosion in each cylinder. A turbocharged engine produces more power overall than the same engine without the charging. This can significantly improve the power-to-weight ratio for the engine.

Turbochargers allow an engine to burn more fuel and air by packing more into the existing cylinders. The typical boost provided by a turbocharger is 6 to 8 pounds per square inch (psi). Since normal atmospheric pressure is 14.7 psi at sea level, you can see that you are getting about 50 percent more air into the engine. Therefore, you would expect to get 50 percent more power. It's not perfectly efficient, so you might get a 30- to 40-percent improvement instead.

A turbocharger helps at high altitudes, where the air is less dense. Normal engines will experience reduced power at high altitudes because for each stroke of the piston, the engine will get a smaller mass of air. A turbocharged engine may also have reduced power, but the reduction will be less dramatic because the thinner air is easier for the turbocharger to pump.

If a turbocharger with too much boost is added to a fuel-injected car, the system may not provide enough fuel, so either the software programmed into the controller will not allow it, or the pump and injectors are not capable of supplying it. In this case, other modifications will have to be made to get the maximum benefit from the turbocharger.

1.6 Schedule of Task/ Gantt chart

Activities	Week														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
The PSM Title selection and confirmation of title															
Confirmation of title, scopes and objectives															
Research, data collection and study information															
Literature Review															
First Draft															
Power Point															
Presentation															

Progress of PSM 1

Activities	Week														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Study of Turbo Charger															
Automotive workshop															
First Draft															
Power Point															
Presentation															
Final Theses															

Progress of PSM 2