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**SHAH ALAM**

**Title**

**STUDY OF COOLING PERFORMANCE OF AIR-COOLED  
ENGINE**

**by**

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# TABLE OF CONTENTS

## ABSTRACT

## ACKNOWLEDGEMENT II

## CHAPTER 1 — INTRODUCTION 1

## CHAPTER 2 — ENGINES COOLING SYSTEM 3

2.1 The Purpose of Engine Cooling System 3

2.2 Air – Cooled Engine Cooling System 5

2.3 Liquid – Cooled Engine Cooling System 8

## CHAPTER 3 — FUNDAMENTALS OF HEAT TRANSFER 9

3.1 Heat Transfer by Conduction 9

3.2 Heat Transfer by Convection 13

3.3 Transmission of Heat from a Solid Body to Air 15

3.4 Type and Thickness of the Boundary Layer 17

3.5 Surface Friction 20

3.6 The Surface Coefficient of Heat Transfer 23

## CHAPTER 4 — HEAT TRANSFER THROUGH CYLINDER WALLS 24

## CHAPTER 5 — THERMAL BALANCE OF THE ENGINE 30

5.1 Heat Removed by Cooling 30

5.2 Thermal Load on the Interior Surface of the Cylinder 32

5.3 Distribution of Heat Between Head and Cylinder 33

5.4 Removal of Heat from the exterior Surface of the Cylinder 35

## ABSTRACT

The use of direct cooling systems for automotive internal combustion engines has been less spectacular in United Kingdom, U.S.A., Asia or even Malaysia than on the Continent of Europe but designers now recognise that the weight-saving and other advantages of this system, as compared with liquid-cooling, are substantial and merit much closer attention and investigation.

The study of cooling performance of air-cooled engine is therefore important for the development of the air-cooled engines in order to gain the best results in this field. In this thesis, there are theoretical and practical studies of the air-cooled engine cooling system that have been focused and discussed. The first is on the principles and theory which covers introduction of the air-cooled engine, engines cooling systems, fundamentals of heat transfer, heat transfer through cylinder walls, thermal balance of the engine and the finned surface.

On the practical studies, an experiment of cooling performance has been carried out on the two different types of engine. This experiment is mainly focused on the effect of the cooling fins on the cooling performance of the engine. The reason of the experiment being carried out on the two different types of engines is to compare the effectiveness of the cooling performance of both engines.

Interestingly, it was found that if the research and development of the air-cooled engine are focused on the great advantage of the air-cooled engines and optimum effects of the influences of the performance of air-cooled engines without doubt the air-cooled type engines could topple the wide applications of the liquid-cooled engines in terms of reliability, engine performance and others advantages which can be discovered through thorough investigation.

All the comments and conclusions on the carried out experiment are based upon the theoretical facts and the practical practices that have been done by numbers of experts that are included in this report. Therefore, all the information given in this report will be useful and benefited to future students who will involve in this field and hopefully it could meet the widening needs and interests of the technical people in automotive.

## ACKNOWLEDGEMENT

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Regards,

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## INTRODUCTION

The use of direct cooling systems for automotive internal combustion engines has been less spectacular in Malaysia and in Asia region or either in U.K. and U.S.A. than on the Continent of Europe but designers now recognize that weight-saving and other advantages of this system, as compared with liquid-cooling, are substantial and need much closer attention and investigation. Nowadays, the direct cooling system is largely utilised in lightweight engines such as motorcycle, lawn movers, chain saw and etc.

It is correct to say that all vehicle engines are air-cooled. Even in water-cooled engines, heat is transmitted first from cylinder to water and then, in radiator, from water to air. This method of cooling by water is easy to accomplish, because the heat taken off the hot cylinder walls by water can be distributed without difficulty upon the large cooling surface of radiator, so that easy transmission of heat is made possible. Many vehicle engines are cooled by water; however the great advantages of cooling engines by air are gradually being recognized.

In the internal combustion engine, only one third of the heat energy contained in fuel is converted into work, one third is lost in the exhaust gases, and one third is carried off by cooling. This distribution of available energy is approximate only, the exact relation depends on the specific factors such as engine design, type of fuel, cooling system and etc. Heat carried off by cooling must be considered as a definite loss, because apart from the fact that no useful work can be obtained from it, part of the engine power is frequently used for its removal. Therefore, every endeavour must be made to keep this loss of heat energy at a minimum level.