

**FINAL YEAR PROJECT REPORT
FACULTY OF MECHANICAL ENGINEERING
UNIVERSITY OF TECHNOLOGY MARA
SHAH ALAM
SELANGOR DARUL EHSAN**

**LUBRICANT OIL TEST AS BASE ON ENGINE
MAINTENANCE**

**BY
MOHD FAIRUS BIN MUSTAFA
SAIDI BIN SALIM @ ABDULLAH**

APRIL 2001

ACKNOWLEDGMENT

In the name of Allah the Most Beneficent, the Most Merciful.

In wish to convey our sincere thanks to our final project supervisor Dr. Rahim bin Atan for the advise, guidance, supervision, encouragement and criticism throughout the course of work.

The same goes to staff in Mechanical Engineering Laboratories En. Mohd Sopi Bin Saleh for his help in doing experiment of work, who has rendered helps and operation all the way through.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

ABSTRACT

CHAPTER 1: INTRODUCTION

- 1.1 General
- 1.2 Lubrication of Engines
- 1.3 Why Engine Fail?
- 1.4 Maintenance
- 1.5 Objective

CHAPTER 2: LITERATURE REVIEW

- 2.1 Lubricant Properties
 - 2.1.1 Viscosity
 - 2.1.2 Kinematics Viscosity
 - 2.1.3 Viscosity Index
- 2.2 Lubricant Oil
- 2.3 Lubricant Oil Test
 - 2.3.1 Significant of Tests
- 2.4 Effect of Engine Operation on Lubricant
 - 2.4.1 Viscosity and Viscosity Index
- 2.5 Wear in Engines
- 2.6 Maintenance
 - 2.6.1 Preventive Maitenance
 - 2.6.2 Breakdown Maitenance

| | | |
|---------|--------------------------------------|----|
| 2.7 | Engine Maintenance | 23 |
| 2.7.1 | Maintenance Concepts | 23 |
| 2.7.1.1 | Corrective Maintenance | 23 |
| 2.7.1.2 | Planned (Scheduled) Maintenance (PM) | 24 |
| 2.7.1.3 | Realibility Centred Maitenance (RCM) | 24 |
| 2.7.1.4 | Condition Based Maintenance(CBM) | 25 |

CHAPTER 3 METHODOLOGY

| | | |
|---------|--|----|
| 3.1 | Introduction | 26 |
| 3.1.1 | Measurement of Viscosity | 26 |
| 3.1.2 | Wear Metal Measurement | 31 |
| 3.1.3 | Oil Debris Size Consideration | 31 |
| 3.1.3.1 | Ferrographic Analysis | 33 |
| 3.1.3.2 | Direct Reading Ferrography | 33 |
| 3.1.3.3 | Sample Calculation For Particle Size | 34 |
| 3.1.3.4 | Spectrometric Analysis | 35 |
| 3.2 | Lubrication Tests | 37 |
| 3.3 | Types of Lubricant Oil | 39 |
| 3.4 | Types of Engine | 39 |

CHAPTER 4 EXPERIMENTAL WORK

| | | |
|---------|--------------------------------------|----|
| 4.1 | Experiment Set-up | 40 |
| 4.2 | Materials | 40 |
| 4.3 | Preparation of Specimen | 40 |
| 4.4 | Types of Testing Equipment | 41 |
| 4.4.1 | CANNON C-T Constant Temperature Bath | 41 |
| 4.4.1.1 | Experimental Procedure | 41 |

ABSTRACT

An experimental study of lubricant oil which relate to an engine maintenance is carried out.

In this case , we could apply the same analogy of a doctor to check'the disease of his patient. By analyzing of the urine, he could know the type of disease and able to give the suitable treatment for his patient. Similarly, to check the performance of an engine, we could analyze through the lubricant oil which have been used in the engine. From the analysis, the condition of the engine can be known and therefore an effective maintenance is obtained.

One of the reasons for reduced performance of an engine is due to low quality of lubricant oil. This test is conducted using motorcycle model Honda C70, running on the road for accumulated duration of 50 hours. Almost similsr test was conducted on Produa Kancil 850 for running at 400 hours respectively. Ferrographic, spectrometric and viscosity were analyzed for engine diagnostic.

Some of the properties of lubricant oil will be observed. The engine performance and maintenance will be decided from the observation. For this case of study, investigated parameters will include viscosity and wear particles of the lubricant oil.