UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Qualitative analysis of lubricant oil from fishing boat around strait Malacca

This report submitted in accordance with requirement of the UniversitiTeknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Engineering Technology (Automotive Technology)(Hons.)

by

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APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor Degree of Engineering Technology (Automotive Technology) with Honors. The member of the supervisory is as follow:

……

(DR. NONA MERRY MERPATI MITAN)

DEDICATION

To beloved father MR MUSANIB BIN JUBARI and my beloved mother MADAM MIZAH BINTI AHWAL. To my supervisor DR NONA MERRY MERPATI MITAN and to all lecturers and friends of their help and motivate on me.

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THANK YOU.

ABSTRAK

Dalam bidang sebenar, kebanyakan nelayan tempatan tidak menggantikan pelincir mengikut arahan yang diberikan untuk penyelenggaraan enjin. Sebagai elemen penting dalam enjin, minyak pelincir mempunyai tempoh masa penyelenggaraan. kebiasaan tempoh masa minyak pelincir adalah 100 jam berjalan. Projek ini menggunakan minyak pelincir sintetik untuk 2 lejang gear sangkut. Analisis minyak telah dibuat untuk mendapatkan maklumat mengenai masa hidup dan sifat-sifat pelincir marin. Dua jenis enjin bot nelayan dinilai sekitar Kuala Merlimau dan Serkam adalah enjin Yamaha 60 dan Suzuki 30. Perbandingan kelikatan, takat kilat, kehausan, kandungan air, jumlah asid, dan pengoksidaan pelincir diperhatikan selepas dan sebelum digunakan. Pembolehubah untuk projek ini adalah dua jenis enjin 2 stroke bot sangkut dan juga masa yang diambil untuk melaksanakan penyelenggaraan pelincir gear. Dari analisis, pelincir takat kilat ketara berubah suhu 198 oC pelincir baru beralih kepada 97 oC (Yamaha 60) dan 78 oC (Suzuki 30) masing-masing. Daripada analisis, keputusan tertinggi memakai didapati 100% daripada digunakan Suzuki 30 selepas 3 bulan (kira-kira 600 jam). Kandungan air pada minyak pelincir Suzuki 30 yang sama mempunyai bilangan tertinggi 410.644 ppm. Dari analisis, ia membuat kesimpulan bahawa penyelenggaraan gear di pelincir enjin bot tidak boleh lebih daripada penggunaan selama 3 bulan atau kurang tempoh 600 jam. Kajian ini telah dijalankan dengan jayanya dan telah dapat menentukan penyelenggaraan gear pelincir yang sesuai dan boleh mengekalkan fungsi kotak gear dengan baik.

ABSTRACT

In the real field, most local fishermen do not replace lubricant regularly according to the assigned instruction to engine maintenance. As an important element in engine, lubricant has a duration time of application. General duration time of marine lubricant is 100 hours of running. The project characterized lubricating synthetic oil for 2-stroke outboard gear. Analysis of the oil has been made to obtain information about the life time and properties of marine lubricant. Two types of fishing boat engines evaluated around Kuala Merlimau and Serkam were engine Yamaha 60 and Suzuki 30. The comparison of viscosity, flash point, wear, water content, acid number, and oxidation of lubricants were observed after and before use. The variables for this project are two types of engines 2 stroke outboard boat and also the time taken to perform maintenance gear lubricants. From analysis, the flash point lubricants significantly changed the temperature of 198 ^{o}C of new lubricants turned to 97 ^{o}C (Yamaha 60) and 78 ^{o}C (Suzuki 30) respectively. From the analysis, the highest results of wear of was found 100% from used Suzuki 30 after 3 months (approximately 600 hours). The water content at the same lubricant Suzuki 30 has the highest number of 410,644 ppm. From the analysis, it is concluded that the maintenance of the gear in the boat engine lubricants should not be more than the use for 3 months or less duration of 600 hours. The study was successfully conducted and has been able to determine the appropriate gear lubricant maintenance and can maintain the function of the gearbox properly.

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LIST ABBREVIATIONS

ASTM	American Standard Testing Method
R&D	Research and Development
CAGR	Compound Annual Growth Rate
NAC	Naphthenic acid corrosion
TAN	Total acid number
RPM	Revolution per minute
SOHC	Single Over Head Camshaft

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CHAPTER 1
INTRODUCTION

1.0 Introduction

Nowadays, in the world of motoring machinery, there are has many tools and machine parts are contact each other and will generate friction. The components involved are mostly using metal that perform specific movements each time it run. Without a lubricant the movement of these components will produce high pressure and high temperature, and can cause wear on the components (Freeman, 1962).

Lubricants work smooth the movement of automotive engine part and marine engine (e.g. outboard engine boat or inboard engine boat) also apply the lubricant to reduce friction, so that it can protect from being wear by the separation of surfaces, metallic or plastic, which are moving with respect to each other (Anand, 2015).

In the marine field also have the things that are involved with the use of lubricants in the engine and gear box. A lubricant was used have different types according to the type of engine used and it also has the use of a different duration time.

In 2013, total market demand have shown Mineral oil was the largest product segment and accounted is 88%. Cheap and ease of use of mineral oils along with mounting stash for Research and Development, R&D have been the

major factors in charge for the growth of the market over the last few years. Next six years, Mineral oil is also anticipated to experience highest growth will be rate over. The segment is predictable to grow at an expected Compound Annual Growth Rate, CAGR of 3.6% from 2014 to 2020 and global marine lubricant market volume was 2,428.7 kilo tons in 2013. Total market volume accounted is 46.3% and engine oil emerged as the primary application segment and growing engine capacities and efficiency in ships is estimated to drive the demand for engine oils. At an estimated CAGR of 3.4% from 2014 to 2020. Next, total demand for Europe emerged as the leading district market for marine lubricant and accounted is 46.2%. Europe next to with being the largest market. To fuel the Asia Pacific marine lubricants market over the forecast period, India and China is anticipated growth of shipping industry attached with governmental support in form of freight tax relaxation. The global marine lubricants market participants compete on the basis of product development and overall profitability and the market are oligopolistic in nature (Kumar, 2016).

1.1 Problem statement

Lubricant is important element in engine. It has a duration time follow types of lubricant such as organics and synthetic lubricants. For marine lubricant general duration time is 100 hours during running. Most local fishermen do not replace lubricant regularly according to the assigned instruction to maintenance the engine.

Therefore, the irregular replacement of lubricant arise problems in the gear transmission system such as torque engine drop and performance of outboard boat engine during running. Another than that, the proper maintenance also will give effect to performance of outboard boat engine during running.

.

1.2 Objectives

a) To study the chemical and physical properties of lubricant based on condition monitoring of outboard engine with different duration time.
b) To compare the properties of lubricant (wear, flash point, viscosity, water content, and acid number) from two stroke outboard engine before and after running.

1.3 Scope

Collection used lubricants outboard engine (Yamaha 60 and 30) from local fishermen at *Kuala Merlimau* and *Serkam,* Malacca will be performed. The used oils are collecting with duration time of 1 month (approximately 200 hours), 2 months (approximately 400 hours), and 3 months (approximately 600 hours). Analysis of the lubricant samples to identify (wear, flash point, viscosity, water content, and acid number). After that, the condition of lubricant will be compared between fresh and used lubricant. Recommendation to the local fishermen about a proper maintenance for engine will be provided based on analysis of lubricants.

CHAPTER 2
LITERATURE REVIEW

2.2 Outboard motor

An outboard motor is a propulsion system for boats, consisting of a self-contained unit that include engine, gearbox and propeller or jet drive, designed to be affix to the outside of the transom. They are the most general motorized method of propelling small watercraft. As well as providing propulsion, outboards provide steering control, as they are designed to pivot over their mountings and thus control the direction of thrust. Unlike inboard motors, outboard motors can be easily removed for storage or repairs.

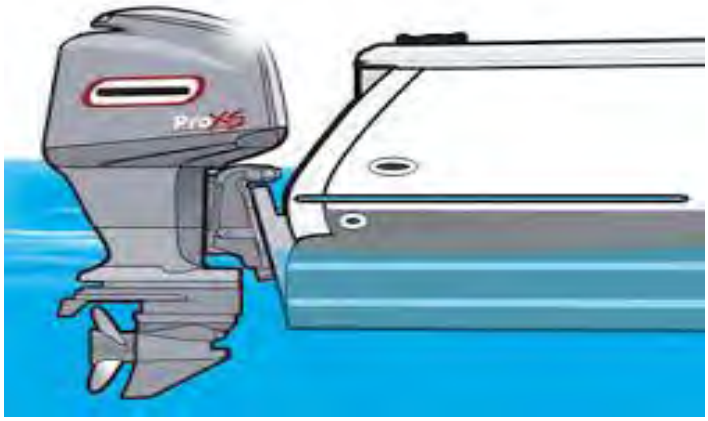

Figure 2.1 Outboard motor

The operation of outboard motor is firstly, fuel burns in the cylinder to make power. There is a fuel tank inside the case of the motor at the top; sizes tank can hold perhaps 23 liters of gas. Next, power from the burning and expanding fuel gases, a piston moves back and forth in the cylinder. This is same like the piston in a car-engine cylinder and often works through the same four-step process although some outboards do use a simpler two-stroke cycle. The piston rod turns the crankshaft, converting the back-and-forth motion of the piston into round-and-round motion. The crankshaft turns the main driveshaft running down the long spine of the motor. A small gearbox at the bottom of the driveshaft converts vertical spinning motion into horizontal spinning motion. The propeller powered by horizontally spinning gears powers the boat through the water (Ed Herman, 2009).

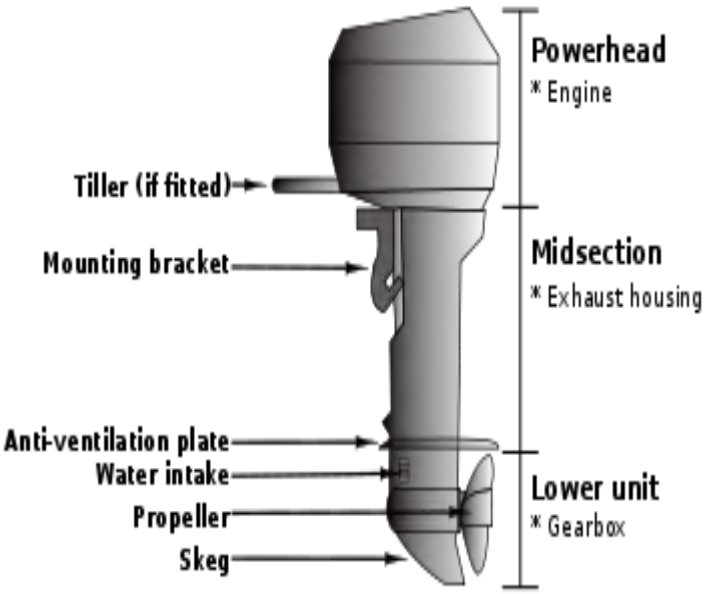

Figure 2.2 Outboard motor engine components

2.3 Transmission system.

A transmission is a machine in a power transmission system, which provides controlled application of the power. Often the term transmission refers simply to the gearbox that uses gears and gear trains to provide speed and torque conversions from a rotating power source to another device. The term transmission refers to the whole drive train, including clutch, gearbox, prop shaft (for rear-wheel drive), differential, and final drive shafts. The most common use is in motor vehicles, where the transmission adapts the output of the internal combustion engine to the drive wheels. Such engines need to operate at a relatively high rotational speed. The transmission reduces the higher engine speed to the slower wheel speed, increasing torque in the process. Transmissions are also used on pedal bicycles, fixed machines, and where different rotational speeds and torques are adapted. A transmission has multiple gear ratios with the ability to switch between them as speed varies. This switching may be done manually or automatically. Directional (forward and reverse) control may also be provided. Single-ratio transmissions also exist, which simply change the speed and torque of motor output (Freeman and S. A. Velinsky, 2008).

Figure 2.3 Land vehicle transmission system

In motor vehicles, the transmission generally is connected to the engine crankshaft via a flywheel and/or clutch and/or fluid coupling, partly because internal combustion engines cannot run below a particular speed. The output of the transmission is transmitted via the driveshaft to one or more differentials, which drives the wheels. While a differential may also provide gear reduction, its primary purpose is to permit the wheels at either end of an axle to rotate at different speeds (essential to avoid wheel slippage on turns) as it changes the direction of rotation.

Figure 2.4 Boat transmission system

2.3 Outboard transmission system

The marine transmission is realizing that despite the identical nomenclature, it has virtually nothing in common with the transmission of car. The function of that device is to change the ratio of engine rpm to wheel rpm a number of times and car can accelerate from a dead stop to a desirable cruising speed in a relatively short time and run at that speed with a high degree of efficiency. A key part of the automotive transmission's function is providing