

Effect of Lubrication Age on Main Engine Temperature Km. Logistik Nusantara 4

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Published: 30 Maret 2024

Abstrak - Yang diperlukan dalam sistem pelumasan ini adalah bagaimana menghasilkan pelumasan yang optimal dari berbagai kondisi, baik dari jenis bahan pelumas maupun sistem kerja mesin induknya. Apabila sistem pelumasan tidak memuaskan maka akan menyebabkan rusaknya lapisan oli pelumas dan menyebabkan keausan serta memperpendek umur mesin induk. Hal ini terjadi karena tidak adanya pelumasan yang sempurna untuk menghindari gesekan. mengetahui pengaruh peningkatan temperatur oli pelumas pada mesin induk KM. LOGISTICS NUSANTARA 4, Penelitian dilakukan dengan menggunakan metode observasi dan wawancara. Hasil penelitian menunjukkan bahwa suhu mesin induk meningkat dan mengakibatkan percepatan kerusakan pada mesin. Bagian-bagian mesin akan menjadi panas dan mengembang sehingga berpotensi menyebabkan komponen mesin cepat rusak atau aus

Kata kunci: pelumasan. Mesin induk, pendingin

Abstract - What is needed in this lubrication system is how to produce optimal lubrication from various conditions, be it from the type of lubricant material or the working system of the main machine. If the lubrication system is unsatisfactory, it will cause damage to the lubricating oil layer and cause wear and shorten the service life of the main engine. This happens because there is no perfect lubrication to avoid friction. determine the effect of increasing lubricating oil temperature on the KM main engine. LOGISTICS NUSANTARA 4, Research was conducted using observation and interview methods. The results of this research show that the temperature of the main engine increases and this results in accelerated damage to the engine. Engine parts will get hot and will expand, potentially causing engine components to quickly become damaged or worn out

Keywords: lubrication, main engine, cooling

1. INTRODUCTION

Ships are an economical means of sea transportation compared to land or air transportation because the volume capacity of the goods being lifted is greater. The transportation process can take place safely, quickly and economically if it is supported by a good ship engine that is smooth in operation. Good ship operation cannot be separated from the main propulsion engine which can work well and smoothly. This main driving engine can be influenced by the amount of lubricating oil pressure so that it can support the performance of the main engine.

One of the supporting factors for the smooth running of the motor (how come the motor + main engine) is lubrication, because insufficient lubrication of the main engine will have an impact on parts that touch or rub together, if this happens it will result in fatal damage which will disrupt operation. Therefore, lubrication is very influential on the smooth operation of the main engine. Based on this, researchers are very interested in this problem, especially regarding the influence of the age of lubricating oil and the consequences it will have. To ensure that the machine runs smoothly, a regular and systematic lubrication system is required. This is very necessary for the main engine as the main driver and its supporting installations. Using the right lubricating oil according to the main engine rotation will provide great benefits for ship operations[1].

What is needed in this lubrication system is how to produce optimal lubrication from various conditions, be it from the type of lubricant material or the working system of the main machine. If the lubrication system is unsatisfactory, it will cause damage to the lubricating oil layer and cause wear and shorten the service life of the main engine. This happens because there is no perfect lubrication to avoid friction. Lubricating oil is a mixture of hydrocarbons plus selected chemical substances called additives. Stable additives can prevent or reduce the corrosion and oxidation properties of lubricating oil. No need to look for reasons why lubricants are important.

2. METHOD

The research was carried out by observing and interviewing the Head of the Engineering Room on 26 July 2020 – 18 April 2023 on the KM Ship. LOGISTICS NUSANTARA 4. In conducting this research the author used equipment such as a thermometer, thermometer, and flashlight. To obtain objective data, as an effort to complete the writing of this scientific paper, the author uses various methods in collecting data, the methods used are as follows: Observation is defined as the systematic observation and recording of symptoms that appear in the object of direct observation. Observations were made regarding maintenance of the lubrication system at KM. NUSANTARA LOGISTICS 4. Before observations are carried out, knowledge must first be prepared regarding attitudes, behavior and actions that apply in the environment that is the object of research. Because the target of observation is humans who have thoughts where these thoughts have a reciprocal relationship with attitudes, behavior and actions, observation must also ensure that thoughts and feelings proceed naturally. Each observation must also be linked to two things, namely information and context. Therefore, observation does not only record an event, but also things that are thought to be related. That is why observations must be as extensive as possible and records of observation results must be as complete as possible. The interview method was carried out regarding maintenance and the impact on the main engine. Interviews were conducted with the head of the engine room related to lubrication system maintenance. The interview asked several questions related to the lubrication system before and after a problem occurred.

2.1 Lubricating Oil

2.1.1 Understanding Lubricating Oil

According to [2] Lubricating oil is a liquid substance or liquid object that is used as lubrication in a machine. Lubricating oil functions to reduce wear due to friction and as a coolant, sound dampener and vibration damper.

Lubricating oil must be used properly, because the properties of lubricating oil should protect parts that come into direct contact. If it is used not according to the specified standards, it can result in the components being lubricated being quickly damaged/worn out. The temperature of the lubricating oil must also be maintained at a normal temperature standard of 40°C - 50°C and an abnormal temperature of 50°C - 75°C.

2.1.2 Properties of Lubricating Oil

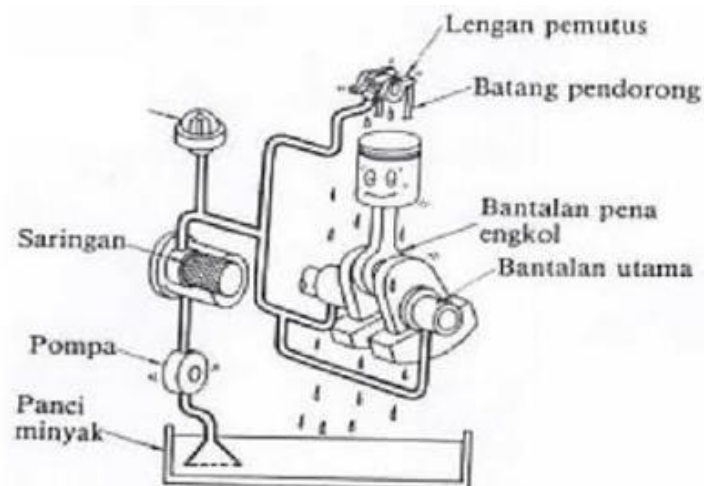
According to Mustafa (2017) lubricating oil must have the following properties:

- 1) Viscosity: Viscosity is the viscosity of a lubricating oil which is a measure of the speed at which a lubricating oil moves towards a component
- 2) Pour Point: The pour point is the temperature at which the oil will not flow when the test tube is placed 45° horizontally. A relatively high pour point affects the ability to pump oil through an engine lubrication system with a number of small tubes and orifices.
- 3) Carbon Residue: Carbon residue is the amount of carbon left behind after a volatile substance has been evaporated and burned by heating the oil. This will show the amount of carbon that can be deposited in the engine which will interfere with operation
- 4) Flash point: The flash point is the temperature at which the oil vapor above the oil will ignite when exposed to a small fire. The flash point of lubricating oil is determined by the same method as that used for fuel oil. The flash point of various diesel lubricating oils varies from 340 to 430 F.
- 5) Sediment Water: Sludge water is oil tested by centrifuging and must be free from water and sediment. Of course there should be no impurities in the supply of lubricating oil. Most of the open oil pans on existing diesel installations remain open. Dirt will bind and enter the oil and then stay in the oil channels
- 6) Acidity: Acidity means that lubricating oil must show a neutral reaction when tested with litmus paper. Acidic oil tends to corrode or pit machine parts and forms an emulsion with water and forms sludge with carbon
- 7) Oxidation: Oxidation means that the oil should not have a strong tendency to oxidize, because oxidation causes the formation of sludge. Oxidation and sludge formation in the crankcase or anywhere in the diesel engine lubrication system is undesirable, due to the possibility of disrupting oil flow and weakening lubrication in parts where sludge builds up. Where is the theory about the life of lubricating oilc.

According to [3], maintenance is a combination of activities aimed at maintaining and returning equipment to its original condition so that it can be used again or a function of damage which can be interpreted as meaning

that if damage occurs, maintenance is required. Maintenance in changing lubricant in several places on the main machine, including providing lubricant to parts that move with each other. The purpose of lubrication is:

- 1) Reduce friction: The engine on a ship consists of several components, some components are stationary and some are moving. The movement of components against each other will cause friction, and friction will reduce power, cause wear, produce dirt and heat. In order to reduce friction, the rubbing parts are coated with lubricating oil (oil film).



Gambar 1. Poros Engkol [4]

- 2) As a damper: The piston, piston rod and crankshaft are parts of the engine that receive fluctuating forces, so that when they receive large compressive forces they can cause loud impacts and make noisy sounds. Lubricants function to coat these parts and reduce impacts that occur so that the engine sound is smoother.
- 3) As anti-rust: The lubricant system functions to coat the metal with oil, thereby preventing direct contact between the metal and air or water and the formation of rust can be avoided.
- 4) Control the occurrence of vibrations: So here there is an aspect of protecting the weakness of the material due to extra loads from machine vibrations.
- 5) As a heat conductor: Lubricants also function as heat conductors. On machines with high rotation speeds, heat will arise in the bearing bearings as a result of a lot of friction. In this case, the lubricant functions as a heat conductor from the bearing to prevent an increase in engine temperature[5].

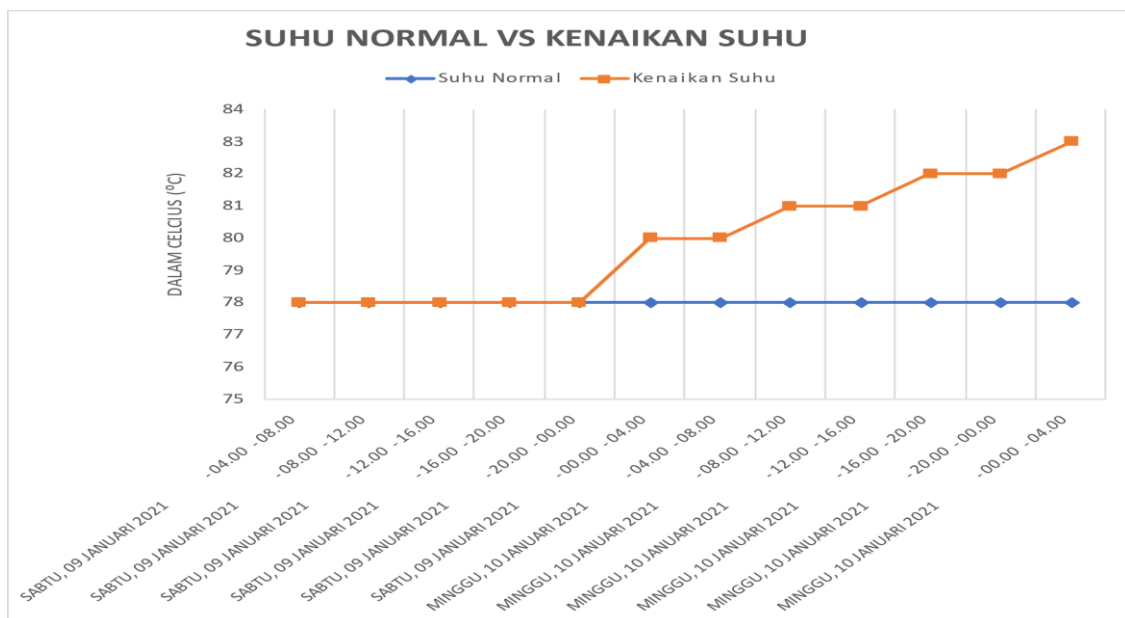
3. RESULTH AND DISCUSS

In accordance with the author's experience during observations at KM. LOGISTICS NUSANTARA 4, on the main engine there is an increase in the lubricating oil temperature of around 300 C from the normal temperature which ranges between 400C - 500C because the heat absorption in the LO Cooler is not optimal due to blockages in the cooler capillary pipe and sea filter, the LO cooler cooling capacity is reduced, The cooling temperature of the sea water entering the LO is too high.

Table 1. Temperature increase based on watch hours

No	Day/Date	Watch Hours	Watch Date and Hours	Normal Temperature	Temperature Rise
1	Saturday, 09 January 2023	04.00-08.00	Saturday, 09 January 2023-04.00-08.00	78°C	78°C
2	Saturday, 09 January 2023	08.00-12.00	Saturday, 09 January 2023 -08.00-12.00	78°C	78°C
3	Saturday, 09 January 2023	12.00-16.00	Saturday, 09 January 2023-12.00-16.00	78°C	78°C
4	Saturday, 09 January 2023	16.00-	Saturday, 09 January 2023-	78°C	78°C

No	Day/Date	Watch Hours	Watch Date and Hours	Normal Temperature	Temperature Rise
		20.00	16.00-20.00		
5	Saturday, 09 January 2023	20.00-00.00	Saturday, 09 January 2023-20.00-00.00	78°C	78°C
6	Saturday, 09 January 2023	00.00-04.00	Saturday, 09 January 2023-00.00-04.00	78°C	80°C
7	Sunday, January 10 2023	04.00-08.00	Sunday, January 10 2023-04.00-08.00	78°C	80°C
8	Sunday, January 10 2023	08.00-12.00	Minggu, 10 Januari 2021-08.00-12.00	78°C	81°C
9	Sunday, January 10 2023	12.00-16.00	Sunday, January 10 2023-12.00-16.00	78°C	81°C
10	Sunday, January 10 2023	16.00-20.00	Sunday, January 10 2023-16.00-20.00	78°C	82°C
11	Sunday, January 10 2023	20.00-00.00	Sunday, January 10 2023-20.00-00.00	78°C	82°C
12	Sunday, January 10 2023	00.00-04.00	Sunday, January 10 2023-00.00-04.00	78°C	83°C



Gambar 2. Graphic of Temperature

On January 9, 2023, KM. LOGISTICS NUSANTARA 4 is on a voyage to Kijang Harbor. The temperature of the lubricating oil experienced the highest increase compared to before, namely from 780 C to 830 C, so that the L.O cooler was cleaned unplanned [6]. Causes of increasing lubricating oil temperature in engines on KM ships. NUSANTARA LOGISTICS 4 is caused by several factors, including[7]: The heat absorption in the L.O cooler is not optimal. The heat absorption in the L.O cooler is not optimal due to the blockage of dirt such as mud and dirt. The large amount of dirt/mud in the L.O cooler pipe will hinder the flow of sea water entering the pipe, being the main cause of less than optimal heat absorption in the L.O cooler and causing less than optimal sea water cooling pressure. To make the heat absorption in the L.O cooler more effective, it is necessary to clean the capillary pipe holes that are clogged with dirt. The effect is that the main engine experiences an increase in temperature and this results in accelerated damage to the engine[8].

To circulate cooling water in the system, a pump is required. On the ship where the author carried out data observations, the pump used was a centrifugal pump with a pressure of 2 kg/cm² which was driven by an electric motor. In this case the pump pressure decreases to 0.5 kg/cm². If the capacity of this pump decreases, the cooling water circulated in the system decreases so that the heat absorption process in the lubricating oil will decrease and result in the temperature of the lubricating oil increasing, and this can be overcome by checking the condition of the impeller for scale that may be attached to the blades. The effect is that the main engine

temperature increases and this results in accelerated engine damage. The age of engine lubrication has reached the normal usage time limit[9]

Because the age of engine lubrication has reached its normal usage time limit, it will affect the temperature and pressure of the main engine[10]. With this, the engine pressure automatically decreases. And if the pressure decreases, the temperature of the lubricating oil will increase. The effect is that the main engine experiences an increase in temperature and this results in accelerated damage to the engine.

4. CONCLUSTION

Based on the discussion about the causes and influence of lubricating oil temperature on the KM main engine. LOGISTICS NUSANTARA 4 which has been described above, the author draws the conclusion that the causes and effects of increasing lubricating oil temperature on the main engine are: The normal heat absorption in the L.O cooler is not optimal because the capillary pipe is clogged with dirt. Sea chest pump pressure decreases because the filter is clogged with dirt or plastic waste. The age of engine lubrication has reached the normal usage time limit. The effect is that the main engine experiences an increase in temperature and this results in accelerated damage to the engine. Engine parts will get hot and will expand, potentially causing engine components to quickly become damaged or worn out. Adapt it to your goals.

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