Efforts To Improve Cooling Water Treatment On The Performance Of Master Engines On Ship KM. Camara Nusantara 1

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Abstract

The cooling system is a medium that serves to absorb heat. The heat is obtained from the combustion of fuel in the cylinder. Engine cooling is intended to maintain a stable temperature in the engine so that there is no too high temperature increase as a result of the combustion of fuel in the cylinder and the friction that occurs. Cooling the engine is also intended to reduce the risk of damage.

The diesel engine cooling system is divided into 2, namely a closed cooling system and an open cooling system. The open cooling water system has an average temperature of 30$^0$ Celsius and the closed cooling water system has an average inlet temperature of 40$^0$ Celsius and an outlet temperature of 70$^0$-80$^0$ Celsius.

Problems that often occur in the cooling water system are broken shaft impellers for seawater pumps, pipe leaks and capillary pipes clogged with dirt. The results of the writing refer to the damage to these components, this causes the fresh water temperature to rise. Therefore, regular and systematic maintenance and repair of these components is absolutely necessary for the cooling system to work optimally.

Keyword : fresh water temperature rises, Cooling water temperature rise pipe, capillary pipe

1. Introduction

The cooling system is one of the most important parts on a ship that requires sufficient attention, because the smooth operation of the ship is very dependent on the work of the engine, because in a diesel engine cylinder walls are always subjected to heat from combustion. If the cylinder is not cooled, the oil that lubricates the piston will dilute and evaporate quickly, so that the piston and cylinder can be damaged by stress due to high temperatures.

As a coolant in diesel motors can be used as air, water and oil. These three cooling materials water is an excellent cooling material to absorb heat. For the cooling process, the ideal cooling
water temperature is 60-70 and as a cooling medium is fresh water and sea water. Seawater is commonly used in cooling systems but can corrode the known surface of the coolant and will also occur the formation of a hard crust on the cooled surface so as to interfere with heat transfer and make the coolant channels narrow and become clogged. Now more widely used is fresh water as a coolant because it has the advantage that all metal surfaces subjected to cooling water are protected from rust (corrosion) the material has longer durability and corrosion caused much more and also does not result in the deposition of crust on a metal surface. Based on the experience of the author at the time of sea practice on the ship KM. Camara nusantara 1 the problem that often occurs in the cooling system is the rising temperature of fresh water caused by leakage of cooling water pipes and clogging of capillary pipes caused by dirt that causes delayed ship operations. From several experiences during the author on the ship and from the observation of the author during duty, it was found that the quality of cooling water is not maintained, causing fresh water temperatures to rise. The importance of the function of the cooling water to support the durability of the parent machine material the author chose the title: “Efforts To Improve Cooling Water Treatment On The Performance Of Master Engines On Ship KM. Camara Nusantara 1”

2. Research Methodology

a. Types Of Research
The type of research used in this study is qualitative research. According to Maleong in the book qualitative research methodology, Herdiansyah (2010) research method is a scientific research that aims to understand a phenomenon in natural social contact by promoting the process of deep communication interaction between researchers and the phenomenon under study.

b. Data Sources
This study uses two types of data sources, namely primary data and secondary data.
1) Primary Data
   Primary Data is a direct data obtained from sources and interviews with research subjects either by observation araupun direct observation. (Sugiyono, 2016) a quality workplace.
2) Secondary Data
   Secondary Data is a source of data that does not directly provide data to data collectors, for example through other people or through documents (Sugiyono, 2009). Secondary Data used in this study came from the management of KM. CAMARA NUSANTARA 1 in the form of documents related to the report. This Data is obtained from the log book filled by The Machinist if carrying out maintenance.

3. Results and Discussion

a. Analysis Of The Causes Of Rising Freshwater Temperatures
   1) Repair and maintenance of pipe leaks
      The presence of pipe leakage will affect the suction pressure or pressure of the cooling water circulation pump. With the occurrence of pipe leaks, the cooling fresh water will open out so that it can cause a reduction in cooling fresh water in the system, pipe leaks
also allow air to enter the system and mix with the cooling water so that it causes a decrease in cooling water pressure. When the cooling water pressure decreases, the water capacity will decrease to cool the engine parts, so that the engine heats up quickly and the cooling water temperature increases. The occurrence of pipe leaks can be caused by several factors, among others; old pipe age factor causing corrosion, lack of good maintenance on the pipe and connect the pipe that is not good welding.

Efforts to repair and maintenance of sea water pipe leaks on the main engine:

a) Make sure the faucet by pass from the sea chest is closed.
b) Prepare keys and tools for other helpers for the process of unscrewing bolts on the pipe.
c) unscrew the pipe bolts
d) ensure all pipe Bolt bond connections are disengaged
e) lift the pipe to be fixed
f) Check and make sure the problem in the pipe
g) prepare the welding machine to make repairs on the leak
h) do welding on pipes that have leaks
i) make sure the welding is done well to overcome the leakage
j) after welding put the pipe back in its original position
k) install the Bolt ties on the pipes and make sure all are connected
l) reopen the faucet by pass sea chest to make sure the pipe has worked normally again.

Figure 1. Welding Process

2) Treatment Of Capillary Pipes Clogged With Dirt
The number of impurities that come along with seawater into the capillary tube Fresh Water Cooler will inhibit the flow of seawater into the cooler as a cooling medium to cool fresh water. Which resulted in fresh water cooling from the Fresh Water Cooler that will go into the main engine is still up. The amount of impurities in the capillary tube can be caused by a filter(filter) seawater does not function properly to filter impurities that come with seawater.

Maintenance efforts carried out to support the performance of the main engine with Preventive Maintenance methods or maintenance carried out on a scheduled basis or replacement of parts (damaged or not the part, will still be replaced):
Treatment measures taken against capillary tube clogged with dirt:
1) Make sure the diesel engine is in cold condition
2) Make sure the expansion and cooling water in cold condition
3) Prepare the tools and keys needed for the work process
4) Remove the capillary tube cover deksel Bolt
5) Lift and remove the capillary tube cover deksel
6) Do welding on pipes that have leaks
7) Waste fresh water that is in expansion
8) Clean or bribe capillary pipes clogged with dirt using bamboo sticks (it is not recommended to use hard materials because of the risk of leakage in the cooler)
9) Spray the cooler grille that has been bribed using water
10) After the dirt has been cleaned replace the capillary tube cover deksel
11) Refill the expansion with fresh water

Figure 2. Bribe fresh water cooler

Figure 3. Fresh water Cooler

b. Impact After Repair And Maintenance
After repairs and maintenance on the fresh water cooling system, the fresh water cooling system also functions to absorb heat on the cylinder wall as a result of combustion in the cylinder can work effectively. The fresh water cooling system can absorb heat on the residual cylinder wall from the combustion chamber. And reduce the risk of lubricating oil that lubricates the cylinder can be damaged due to high temperatures from combustion in the cylinder. The impact after treatment and repair of rising fresh water temperatures make the main engine run optimally because the process of absorption and heat transfer can run well so as to reduce the risk of overheating of the engine. And also reduce the risk of expansion of the engine components that can result in patal on the engine working system.

Figure 4. Thermometer

4. Closing

a. Conclusions
1) Factors causing the rise in temperature of fresh water are damage to seawater impeller Shaft components, pipe leaks and clogging of capillary tubes due to dirt.
2) The impact that will be caused if the fresh water temperature rises, among others, the lack of optimal engine performance, the combustion chamber system is unstable due to the lack of optimal heat absorption from the cooling system and cause engine overheating, and cause delays in the journey or Voyage of the ship.

b. Suggestion
1) In each operation of the main engine do the monitoring of the cooling system and do regular maintenance on the impeller Shaft, pipe system and do the cleaning of the capillary tube regularly to anticipate early so as not to occur faults in the open cooling system.
2) Carry out maintenance on the quality of cooling water, cooling water pressure, cooling temperature and periodically in accordance with the system maintenance plan so that the machine works optimally and the fresh water coolant circulates well to avoid the worst effects that will be caused from damage to the system.

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