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Cooling System Maintenance of Sea Water in Supporting Performance of the Main Engine on SV. Servewell Vigor

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***Abstract*—The goal of the research is to learn more about the primary engine cooling system disruptions. It is anticipated that methods for managing and maintaining cooling water will enable the primary engine to run more efficiently. The author's research methodology will just employ descriptive techniques. By describing several variables related to issues and the unit under study among the phenomena under test, descriptive methods are a type of research that aims to present a comprehensive picture of a social setting or is intended for exploration and clarification of a phenomenon or social reality. According to the study's findings, the author only addresses two of the variables that can disrupt the seawater cooling circulation system.**

Keywords— ***Cooling System, Seawater, Main Engine***

I. INTRODUCTION

One of the most effective modes of transportation is the ship. Ships are also made to be able to satisfy the needs of the modern, complex, and increasingly evolved world in which we live. to aid with the ship's functioning. PT is the owner of the ship SV. SERVEWELL VIGOR. This off-shore server has a GT 500 TON engine that produces 3500 horsepower. Because of this, ship crew members (ABK) must be nimble and knowledgeable about machinery in order for the ship to run well.

The ship is powered by the main engine, which generates power by the combustion of fuel in the combustion chamber. The engine's temperature will rise as a result of the heat produced by burning fuel. Particularly for components that come into direct touch to lessen extra heat in the combustion chamber, a cooling system is required.

A ship's cooling system is a crucial component that needs careful consideration. Because the cylinder walls of a diesel engine are always exposed to heat via radiation combustion—that is, heat transfer by rays or light—the engine's performance essentially determines whether the ship runs smoothly or not. The oil that lubricates the piston will rapidly evaporate and lose its viscosity if the cylinder is not cooled, which might cause damage to both the piston and the cylinder from the high temperatures produced by combustion.

By raising the fluid's pressure, the pump, a hydraulic water flow device, essentially moves incompressible fluids from one location to another. The working fluid will get mechanical energy from the pump, and it will use this energy to boost pressure and overcome resistance in the pump installation channels. The seawater pump used to cool the main engine is a centrifugal pump. A common pump type in industry, centrifugal pumps operate on the basis of the impeller revolving as a water-moving element that is powered by a driver.

The main engine's temperature increased significantly during the incident on board the Sv. Serve well Vigor when the author was conducting marine practical exercises. The author also examined the cooling system at that time. After inspection, it was discovered that the cooling system was either broken or having issues, since the temperature of the media cooled by sea water—which serves as a coolant to support the main engine's smooth operation—rose while the ship was at sea. This resulted from the sea water cooling pump's inspection and maintenance being subpar. Do some research.

According to Biyantoro, Aris (2018) in a study on Optimization of the MT seawater cooling maintenance system. Sengeti stated that the Main Engine is an engine installation consisting of various supporting systems and functions to produce thrust against the ship, so that the ship can move

forward or backward, the role of the seawater cooling pump is very important to support the work of the main engine, because of this, repairs and maintenance are needed considering the importance of seawater cooling, a good maintenance method is needed to optimize seawater cooling pump maintenance for the performance of the main engine using the SWOT method (Strengths, Weaknesses, Opportunities, Treatment) which is a pattern or structure of targets that support and complement each other towards a comprehensive goal.

II. METHOD

The author's research methodology will just employ descriptive techniques. By describing several variables related to issues and the unit under study among the phenomena under test, descriptive methods are a type of research that aims to present a comprehensive picture of a social setting or is intended for exploration and clarification of a phenomenon or social reality. The author noticed that the main engine cooling sea water pump's pressure was dropping, specifically at SV SERVEWELL VIGOR. The author conducted sea exercises on the ship for a total of 12 months in order to conduct research and gather the required data.

The majority of descriptive research aims to define a variable, symptom, or circumstance rather than test a specific hypothesis. This does not imply, however, that all descriptive research is devoid of hypotheses; some descriptive research does employ hypotheses. In descriptive research, hypotheses are used to try to identify something significant as an alternative to solving research problems using scientific techniques, not to be tested. Since this research typically lacks a hypothesis, the author attempts to present the information gathered from studying the SV SERVEWELL VIGOR ship in this final project.

Data collecting method: The information and data needed for this final project were gathered by:

Field Research Methods (Afield)

Specifically, research conducted using means. direct examination of the subject being studied. Direct observations were made in the field when the author conducted practices on board the ship in order to gather data and information.

A literature review, also known as library research, is a type of study that is conducted by reading and analyzing books, articles, and other materials pertaining to the issue under discussion in order to develop a theoretical framework for debating the issue.

1. Data and Data Sources

a. Data Types

Data and data sources utilized to support the discussion of this final assignment include: (1) Primary data, which comes from the author's sea practice location on the ship and is gathered by direct observation. Observation: specifically, the author's approach of directly observing the components and units of the seawater cooling pump installation. based on the author's experience using the SV SERVEWELL VIGOR ship for sea exercise. (2) Secondary data is information gathered from library sources, including literature, lecture materials, and other items relevant to this study, that supplements primary data.

b. Data Sources

The following sources provided the information used in this work: (1) Library books on cooling maintenance. (2) Books that were accessed online. (3) Ship-based reports and firsthand observation data about incidents.

2. Instruments

By asking the crew members questions, the author used their sense of sight to create observations or measurements on each action.

III. RESULTS AND DISCUSSION

The author will describe how to address the reasons behind the rising water temperature emanating from the main engine in this discussion. The following elements contribute to the water entering the main engine becoming hotter: reasons why the heat exchanger isn't operating at its best. Because of dirt accumulation in the heat exchanger hole, heat absorption in the heat exchanger is ineffective. The following actions must be taken in order to regulate heat absorption in the heat exchanger and increase its effectiveness: Clear the dirt-clogged capillary pipe of the heat exchanger. Sea flow entering the heat exchanger pipe to absorb heat in the fresh water exiting the main engine will be hindered by the amount of dirt or mud in the pipe. Cleaning the heat exchanger is required to get past this.

Bribing the capillary tube is the method for cleaning the heat exchanger. After all the water has been removed, we tap the pipes by putting a cleaning tool into the capillary pipe hole and then scrubbing until clean. To do this, we first open the cooler cover on both ends. We spray water into the capillary pipe holes to clean the heat exchanger once all of the holes have been filled. Higher water pressure is used while spraying if needed to ensure that all of the dirt in the capillary pipe is removed. Remove any dirt that may have adhered to the heat exchanger cover before reinstalling it.

The cause of a decrease in the pressure of the main engine cooling sea water pump.

A. Lack of suction and pump pressure that is not running optimally

1. Dirty filter

The main filter of the sea water pump on the ship should be cleaned on a regular basis because it is essential to the pump's efficient operation. However, the supply costs are significantly impacted each time the zinc anode on the filter is inspected to see whether it has to be replaced or may still be utilized because the pump's main filter is cleaned. Lastly, this technique is frequently limited to specific ports, namely those that are extremely foggy and dirty.

2. The impeller is not in good condition

Restores the corrosion process to stop leaks and impeller erosion. Corrosion can be avoided using a variety of

techniques, which facilitates the resolution of the intended issue. Therefore, it is ideal because using alternative alternatives is quite simple. Additionally, it is available aboard ships; all that is needed to apply it correctly and precisely is the machinist's competence. Blockage of the impeller by dirt, debris, or marine life coming through the sea chest results in a drop in sea water pump pressure. In this situation, the best course of action is to clean the sea chest filter and the pump impeller by clearing away any dirt, shellfish, or marine life that the sea chest has sucked in and letting into the pump impeller.

The impeller blades will eventually wear out and become damaged due to the long-term presence of dirt, debris, and sea life on them. If the blades are not cleaned of filth, this will result in a reduction in the water capacity and pressure on the sea water pump. The amount of sea produced is either declining or not at its best. We can clean the impeller blades of filth and replace the pump impeller if it wears out so that the pressure in the pump stays normal.

3. The suction filter is covered with dirt

Trash and mud will obstruct the cooling pump's suction flow when the ship approaches shallow waters, such as beaches or rivers, where there is dirt, particularly plastic. Cleaning the filter is the solution to this problem. In order to prevent trash from being pulled in by the pump, we must utilize a sea chest on the upper side of the ship as long as it enters shallow water.

4. There is a leak in the suction inlet hole.

Air will enter the suction valve if there is a leak in the suction inlet hole. This is the reverse of a pressure valve leak. It turns out that suction valve leaks have a bigger impact than pressure valve leaks. This means that less fluid enters the pump because the incoming air creates a void that is not filled by pressure valve fluid. The liquid will enter the pump housing together with air. If treatment is not received, the pump housing will eventually fill up to the shaft's surface with air, creating a vacuum inside the pump housing. In the event that this occurs, the pump's revenue will be significantly diminished, and it may even become incapable of performing its intended role. Suction valve leaks can be fixed by welding or sealing the leak. If a leak occurs while working, we should initially use rubber or sandals to block the pipe; if this isn't feasible, we can turn off the pump and use the backup pump before fixing the broken one.

5. Liquids contain solid and dirty substances or mud.

Sucked-in solids and dirt can clog the fan blade vessels, and the dirt can narrow the vessels as well. The pump needs to have a decent filter that can contain solids and dirt in order to avoid this. In this situation, a big filter can be utilized to ensure a smooth liquid flow through the channel holes. Clearing the obstructions or turning off the pump will solve the problem if the fan or filter is stuck in the passageways. The nest needs to be transformed into a nest house to keep solid materials and dirt from being drawn in around it. This is to ensure that the liquid that the filter is drawing in is completely pure—that is, free of contaminants or solid materials.

From the results of the discussion, it was concluded that the maintenance that must be carried out is checking the pump suction filter, leaks in the pump packing that are not tight enough or leaks in the piping installation, grease leaks in the bearings. So that the efforts made are to carry out periodic maintenance according to schedule, Biyantoro, Aris (2018).

According to the research, the author exclusively addresses two elements that disrupt the seawater cooling circulation system, specifically 1. Sea water pressure drops as it cools. There are a number of reasons why cooling water pressure can drop, including: a). insufficient cooling water. Because it absorbs heat from the engine to maintain the engine's operating temperature, this cooling water has a significant impact on the cooling system. The engine's temperature will rise if there is a cooling water shortage because the heat absorption process is slowed down. Since the heat received and the cooling water are not comparable, the heat will tend to rise due to the heat transfer that already exists, which moves heat from hot temperatures to hotter ones. The low one.

Leaks in the cooling system installation, expansion of the cooling water as it absorbs heat from the engine, and partially closed taps that impede the circulation of cooling water in the system can all contribute to a cooling water deficit. b). A pipe is leaking.

The suction pressure or cooling water circulation pump pressure will be impacted by the existence of pipe leaks. There may be less cooling fresh water in the system if a pipe leak happens because the cooling fresh water will seep out. Additionally, air can enter the system through pipe breaks and mix with the cooling water, lowering the cooling water pressure. Additionally, if the cooling water pressure drops, the water's ability to cool engine components will also drop, causing the engine to heat up more quickly and the cooling water's temperature to rise. There are a number of reasons why pipes leak, including deterioration due to age, improper maintenance, and poorly welded connections.

IV. CONCLUSIONS

The following conclusions can be made based on the description and discussion of the "Maintenance of the sea water cooling system to support the performance of the main engine on board the SV SERVEWELL VIGOR ship": For issues that occur, the first PMS (plane maintenance service) is not operating correctly. The coolant temperature entering the main engine is higher than usual. The second is that the heat exchanger's cooling system does not function normally due to corrosion and deposition, which results in subpar heat exchanger performance. and the sea water cooling pump's mechanical seal is leaking.

The solution to issues with the sea water cooling system is to perform PMS (Plane Maintenance Service) correctly and on time. Additionally, make sure that the sea water pressure is consistently at normal levels to keep the main engine steady. To ensure that the heat exchanger is free of corrosion and deposition, clean the filter or seawater filter of any debris that has accumulated there and treat the water to stop corrosion-related leaks.

Always examine the saltwater cooling pump to prevent leaks in the mechanical seal. This will help you identify any

issues or causes that may arise with the engine room's seawater cooling pump and prevent more serious issues, Thus, using this chance, the author offers a number of recommendations for businesses and ship crews to take into account, such as the following: In order for the main propulsion engine to run smoothly and without issues when the ship is at sea, engine officers can take on a larger responsibility in maintaining diesel motors in accordance with PMS. It is preferable to focus more on learning and acquiring spare parts so that when damage arises, the equipment can be replaced and corrective action can be taken right away to ensure that diesel motor maintenance is done effectively and efficiently and that maintenance expenses are not wasted. Ship firms are quick to respond to requests for replacement parts in order to stop additional damage, which raises the cost of repairs.

Therefore, the author uses this opportunity to offer some recommendations that the company and the ship's crew should take into account. These include the following: the engine officer can play a larger role in diesel engine maintenance in accordance with PMS, ensuring that the main propulsion engine runs smoothly and that there are no problems while the ship is at sea. In order to perform effective and efficient diesel engine maintenance and to avoid incurring unnecessary maintenance costs, it is preferable to focus more on expertise and the acquisition of replacement parts so that the tool may be changed as soon as damage develops. Requests for replacement parts are promptly addressed by the shipping business in order to stop further damage that would raise the cost of repairs.

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