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The Importance of Anchor Chain Maintenance at MT. Griya Flores

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ABSTRACT
Anchoring is tying the ship to the bottom of the water so that the ship is not exposed to currents and wind. When anchoring anchors, there are often various kinds of problems stemming from internal and external factors. Internal factors themselves include problems with parts of the anchor that support anchor performance caused by lack of maintenance, especially on the anchor chain. This is what makes the author choose to raise the issue of the role of anchor chain maintenance.
The research method used is qualitative descriptive by describing the role of maintaining a good and correct anchor chain. The data used is in the form of primary data obtained through field observations and interviews. Secondary data are obtained through documentation and literature studies.
The results showed the need for anchor chain maintenance procedures to support the implementation of PMS on board, to create safe conditions when docking and support anchor work. The impact that will arise if you do not carry out the role of maintaining a good and correct anchor chain, namely corrosion, exhaustion of wildcat gears, influence on the anchor berthing process, the heavy up anchor process is disrupted and can hamper ship operations.

1. Introduction

Anchor anchoring is the activity of tying the ship to the bottom of the water so that the ship does not drift because the currents and wind marked by the anchor have eaten on the seabed and the ship has no movement anymore. Anchor berthing is carried out in different areas at each port by taking into account the depth of seawater, surrounding conditions, and also the rules that apply at each port (Bruschi & Bartolini, 2018; Liu et al., 2021).

In this case, it does not rule out the possibility of a problem. Problems that occur when anchoring come from various factors originating from internal factors or external factors on board (Rinaldy et al., 2021). Internal factors themselves include problems with parts of the anchor that support anchor performance when drop anchors and heavy up anchors are carried out. Maintenance and completeness of the anchor are very important in supporting safety and smoothness when anchoring. Common problems that often occur due to lack of attention or maintenance on anchor fittings are exhaustion of break linings, worn anchor chains, wear of gypsy wheel gears, bending of the anchor tongue, etc.

When carrying out sea work practices on board MT. Griya Flores the author observed a problem that occurred when the ship docked in Ambon Bay, where the ship experienced problems when carrying out heavy up anchor activities which were influenced by the thinning anchor chain due to rust erosion, so that the anchor chain and gypsy wheel gear did not eat and the anchor could not rise. This problem arises due to lack of care on the anchor chain. This is what made the author choose the title The Importance of Anchor Chain Maintenance in MT. Griya Flores.

2. Materials and Methods

Metode Penelitian

Research method is one way or technical scientific approach in the field of science to obtain facts and develop and test the truth of a science systematically and carefully. The purpose of using this method is so that the results or knowledge obtained from a study can be accounted for. The research method is the basis of a way used to understand an object under study and its problems. From the description above, it can be seen that research methodology has an important role in providing information about the research and how the research written gets answers from what an author researche.

The research method used by the author is a qualitative method, which is research that uses a natural setting with the aim of interpreting phenomena that occur using various existing methods. The qualitative research method used is descriptive which means describing, describing and describing an object systematically, factually and accurately about the phenomenon to be studied. The nature of descriptive research is a method of examining a condition, thought system, group status, or class of events that occur today.

Research Sites

This research was conducted by the author while carrying out practice on board the MT. Griya Flores. Kapal MT. Griya Flores is a tanker type commercial vessel owned by PT. Pelayaran KORINDO.

Sample of Research Data Sources/Informants

For the preparation of this thesis, the author uses several data which are important stages in a research process, this is because with the data obtained correctly, the research process carried out will take place well until the anwer is obtained by the author in accordance with the formulation of the problem set. In this study, the author used a variety of data based on how to obtain it, namely:

1. Data Primer

   Primary data is data obtained directly from individuals or sources through observation and interviews related to ship operational activities and the thesis topic. It's used to answer research questions with opinions, observations, and test results. In this thesis, primary data from sources related to the MT ship, including Giya Flores, was utilized.

2. Data Sekunder
   Secondary data is a source that does not directly provide data to authors or researchers which is used as supporting data from primary data obtained by data collection techniques sourced from literature, journals, books in libraries related to research and regulatory archives, both national and international to support research.

Data Collection Techniques

Sugiyono (Sugiyono, 2019, p. 104) said the data collection technique is the most strategic step in a study because the main purpose of the study is to obtain accurate data, so without knowledge of data collection techniques, the author will not obtain data that meets the standards that have been set.

Therefore, in the preparation of this study, the author obtained these data by taking steps:

Observation

Sugiyono (2019, p. 107) said observation is the basis of all knowledge. Scientists can only work based on data, that is, facts about the world of reality obtained through observation. Through observation, researchers learn about behavior, and the meaning of that behavior.

This data collection technique was carried out by the author on the subject of research by carrying out sea practices on the MT ship. Griya Flores, so that the author can observe the object of research in detail, more carefully and the data collected are in accordance with the reality that existed when the research was conducted.

Thus, the observations made can be poured into verbal language and data can be used to support this research and be believed to be true.

Interview. The interview method is a data collection technique that can be done simultaneously with observation techniques, so that it can be used to explore deeper data and information when making direct observations from the source and in a qualitative approach, this technique is in-depth.

Simarmata et al., p. (2021, p. 101) said that an interview is a question and answer process carried out by two people, namely researchers and research objects (resource persons) in a face-to-face and direct question and answer manner to exchange information and ideas with certain themes. Thus no information is missed between what is seen, heard and recorded.

In making this thesis, the author uses an unstructured (open) type of interview. This technique in qualitative research is used by authors who will start collecting data as people who want to learn, because with unstructured interviews the author is more open in every relevant question asked by listening to what answers are talked about by informants. The interview was conducted to discuss issues related to the role of anchor chain maintenance on board MT ships. Griya Flores.

Documentation

Nurhadi, et al (2022, p. 133) said that the documentation method is a data collection technique through written texts and soft-copy editions, such as books, e-books, articles in magazines, newspapers, bulletins, journals, reports or archives of organizations, papers, government publications and others.

Documentation that is usually included in research comes from documents or records in the form of log books, journals, newspapers and reference books that contain opinions, theories, or laws

that are in accordance with the research problem. The documentation method in qualitative research used in this thesis is in the form of photos and related documents

Qualitative Data Analysis Techniques

Lexy J. Moleong (2017, p. 280) defines data analysis as the process of formally detailing the attempt to find a theme and formulate a working hypothesis (idea) as suggested by the data and as an attempt to provide assistance to that working theme and hypothesis.

In this study, the data analysis technique used by researchers is by analyzing the data obtained from the results of the study. This analysis technique is also called the Miles and Huberman model, which is a technique that uses three stages of data analysis, including:

Data Reduction

Sugiyono (2018, p. 139) said that reducing data is summarizing, focusing on important things, choosing the main things and looking for themes or patterns, and discarding unnecessary ones. Thus data reduction will provide a clearer picture and make it easier for researchers to collect further data, and if needed researchers can look for it.

It can be concluded that reduction can also be defined as the process of selecting, concentrating attention and simplifying, abstracting, and transforming existing rough data from written records or observations in the field.

Data Presentation (display)

Information data that has been reduced and sorted will be presented in detail, thoroughly, and systematically. This is to make it easier to see a picture of the research as a whole or certain parts of the research observations.

Sugiyono (2018, p. 141) said that the presentation of this data can be done in several forms, such as tables, graphs, pie charts, pintograms and the like. Through the presentation of the data, the information or data will be arranged and organized according to the pattern of relationships so that it will be easier to understand and will provide the possibility of drawing conclusions and taking action.

Retraction of conclusions

Drawing conclusions is an effort to find meaning, meaning and explanation of data and information that has been collected and analyzed to find important problems that exist, this is also the ability of researchers to conclude various data and problem findings obtained when research observations are carried out directly.

The initial conclusions presented are provisional and subject to change if strong evidence is not found and cannot support the next stage of data collection. So that conclusions must always be verified during direct research. So the conclusions made can answer the problem formulation formulated from the beginning

3. Result and Discussion

Data Description

This research was conducted based on the existing conditions on the ship and obtained some data on the decrease in smoothness in each anchor berthing activity with constraints when *heave up anchor* chain *anchor slack* with *gypsy wheel* on *the windlass* caused by the start of shrinking the volume of the anchor chain due to corrosion and not maintained properly. This is what underlies the author

to take several data samples which in the end are reduced to summarize the existing data and can be described into a short and clear data. Maintenance of anchor chains carried out on board MT. Griya Flores is observed and adjusted to existing procedures, so that in the end appropriate conclusions can be drawn (Silberzahn et al., 2018).

Based on the results of the research conducted, some data was obtained to support the results of research in the form of:

1. The specifications of the anchor chain on board the MT. Griya Flores

   The anchor chain located on the MT. Griya Flores consists of 7 right anchor *shackles* and 7 left anchor *shackles* with each anchor equivalent to 192.5 meters. The length of each link ranges from 57-65 millimeters when checked, which means that it has decreased in volume which should be 84 millimeters. The anchor chain used is made of steel.
2. Data *Maintenance* chain anchor

   The data were taken and inferred in a table by the authors for 4 months. The author tries to summarize the results of observations and interviews in the field and display it in a form that is easy for readers to understand and to facilitate the author when drawing conclusions from the data. Here is a table made by the author according to observations and interviews in the field (Fathun, 2020).

   Based on the data made and summarized by the author, it can be concluded that for 4 months the author took the data, only in April did the anchor chain maintenance be carried out, while in the following month only planning was held. The maintenance carried out on the anchor chain was not optimal and not in accordance with the plan made, then the author tried to collect several maintenance report files made by the Chief Officer to report to the shipowner company, namely:
   a. Plan Maintenance Schedule (PMS schedule), PMS is a maintenance planning schedule for infrastructure facilities on board MT. Griya Flores is made by all the converts on board and reported to the Chief Officer and sent every month as report data to the shipowner company.
   b. Daily Work / Maintenance Report, Daily work is a daily work report of a ship's crew created by the Chief Officer and sent monthly as a report to the shipowner's company.
3. Interview

   Interview with the crew concerned about the maintenance of infrastructure facilities on board the MT. Griya Flores, i.e. to
   a. Mualim 1: as the person in charge of the performance of infrastructure equipment for the *deck department.*
   b. Bosun: as a fieldwork coordinator who is directly responsible to mualim 1 for the maintenance of infrastructure equipment for the *deck department.*
   c. Skipper: as the person in charge of the smooth running of all ship operations.
4. Documentation

   This documentation is carried out as a confirmation of the results of research conducted in the form of photos and several attachments to the activity of researchers carrying out this research.

Findings

Based on the data described above, several findings of observation, interviews and documentation are obtained which will then be described in more depth to obtain research results that can be interpreted with the opinions of researchers and some opinions of research respondents. The results of the research findings obtained, namely:

1. Less than optimal implementation of Planning *Maintenance System* (PMS)

One of the findings that affect the maintenance of the anchor chain is the lack of proper PMS procedures on board MT. Griya Flores. On each ship maintenance of every existing infrastructure must be scheduled to maximize maintenance activities. PMS that has been made must be used as a reference when maintenance, maintenance and repair will be carried out. The reality is that what happened at MT. Griya Flores in carrying out the PMS schedule there are irregularities that occur, such as the non-implementation of checks and cleaning on the chain locker which is the place where the anchor chain is arranged after being used for berth. In making PMS, it is better to schedule a chain locker check to find out its condition, because if not checked it can cause a buildup of dirt such as mud, garbage, and other foreign objects carried away when the chain is heavy up. This can then cause damage and rusting to the anchor chain, resulting in a short chain life.

a. Crew management is not well organized,
   Good crew management in the steps of making maintenance, maintenance and repair plans on board is needed to achieve maximum work targets more efficiently and quickly completed. In fact, the conditions in which the author conducted research are still lacking in crew management issues. This was conveyed by *boatswain* (foreman / bosun) as the field assistant of Mualim 1 who was directly responsible to Mualim 1 for the crew of the deck ship, one of his duties was to assist officers on board in terms of maintenance of facilities and infrastructure.
b. Sudden improvement
   The discrepancy that occurs between the *maintenance system planning* that has been made by mualim 1 and its implementation in the field, is caused by other damages that are not contained in the PMS *schedule* and require long *service* and *maintenance*. This is an obstacle to anchor chain maintenance and maintenance activities, usually occurs due to sudden *problems* such as those experienced on ships where the author conducted research, namely cargo pipe leaks.

Discussion of Research Results

1. Good and correct anchor chain maintenance procedure at MT. Griya Flores.

The creation of a procedure to avoid damage to the anchor chain is necessary. This is a major factor for the maintenance of the anchor chain, because if there is no procedure, maintenance activities will not run according to the plan (PMS) and its purpose. Maintenance activities carried out in accordance with the procedures made can make the life of the anchor chain longer and can minimize *trouble*, thus making the ship safe when docking (Argüello et al., 2022).

Taking into account the existing factors, the author takes several ways in the form of optimization towards anchor chain maintenance by creating anchor chain maintenance procedures and optimization of planned maintenance systems (Khetagurov, 2009). The author tries to give an opinion on making procedures that should exist to optimize the maintenance of the anchor chain, namely:

a. Anchor chain maintenance procedure,
   1) Familiarization of Planning Maintenance System (PMS) on board through safety meeting
   2) Understanding the existing Planning Maintenance System
   3) Implement the existing Planning Maintenance System
   4) Conducting annual maintenance
   5) Perform monthly maintenance
   6) Perform a chain locker inspection
   7) Performing anchor chain measurements
   8) Reporting the condition of the anchor chain to the company to carry out the replacement
b. Maintenance that must be done
   1) Annual care
      Annual maintenance is carried out every 5 years when the ship docks. Maintenance carried out includes:

a) Production of anchor chains from chain locker,
b) Chain calibration check
c) Chain locker cleaning
d) Chipping and brushing rust on the inside of the chain locker
e) Coating the surface and walls of the chain locker using black varnish
f) Cleaning of anchor chains from adhering dirt
g) Chipping, brushing and coating on anchor chains
h) Repainting and coloring (markings)
i) Conversion of the anchor chain arrangement (the first seal becomes the last seal and the second seal is advanced to the first seal).

2) Monthly maintenance

Monthly maintenance can be carried out side by side with daily work carried out on board by following the existing PMS provisions, which include:

a) PMS *schedule creation*
b) Implementation of PMS schedule
c) Dividing tasks to the crew
d) Chain locker condition check
e) Checking the connection parts between seals (shackle) chain periodically
f) Chain locker cleaning with water spraying
g) Cleaning the anchor chain from mud and garbage carried away when the chain is hibob
h) Chipping, brushing, and coating chains with anti-corrosion coatings
i) Giving marks (colors) at each seal connection
j) Cleaning wildcat or gypsy wheel chipping, brushing, and coating
k) Daily work / maintenance report).

Procedures are a series of carrying out something that exists in a coherent and arranged manner in order to create a good and satisfactory result (Toba et al., 2019). From the existing findings, the author tries to examine the errors that exist in the implementation of maintenance of facilities and infrastructure on board the MT. Griya Flores. Based on the findings, it proves that the errors that exist result from the absence of anchor chain maintenance procedures to support the implementation of PMS and the lack of optimal maintenance system plans on board ships which ultimately have an impact on the maintenance of other infrastructure facilities, such as non-optimal maintenance of anchor chains. This causes an impact and problems arise due to suboptimal anchor chain maintenance (Abdullah & Jatira, 2022).

2. The impact that will arise if it does not carry out the role of maintaining a good, efficient and effective anchor chain

Maintenance that does not use good procedures in its implementation can cause several impacts that can become a problem on board, such as problems found by the author when conducting research. Some of the impacts that will arise, namely: (Tampubolon & Fahmi, 2020)

a. Corrosion

Corrosion is caused due to several existing factors that can be prevented by carrying out maintenance is immediate and does not require a long time. This corrosion can also be anticipated with monthly maintenance made in the PMS schedule, therefore monthly maintenance that has been scheduled in the PMS schedule must be carried out responsibly and in accordance with the direction of the work leader so that the chain does not corrode quickly and the life of the existing chain can last a long time.

b. Exhaustion of wildcat serrations (gypsy wheel)

The exhaustion of the teeth on the wildcat is caused by the chain that has rusted and shrunk making the work of this tool bigger. The chain that decreases in volume also makes the gear on

this wildcat erode slowly due to chains that are no longer biting when hibob chains are carried out, resulting in loss. This has an impact on the performance of wildcat and windlass machines.

c. Influence on anchor berthing process

It can be known that the volume of the anchor chain has been determined in such a way according to the size of the anchor itself. The function of the volume or weight of the chain itself affects the anchor anchor activity when the anchor is in let go, in order to facilitate the anchor feeding with the bottom of the water. Judging from the concept used when knowing the anchor that has eaten or not, namely by looking at the slack and tight on the chain, it can be concluded that the weight of the anchor chain affects the anchor position to maintain the anchor position in a horizontal position. When the ship let go anchor and anchor are carried away at a slow rate of the ship, the weight of this anchor chain will maintain the anchor position in a horizontal state to make it easier for the anchor to eat with the bottom of the waters. Chains that have reduced in volume weight are difficult to make the anchor eat with the bottom of water, this is because if the weight of the chain has been reduced then the position of the chain cannot be completely horizontal.

d. Heavy up anchor *process* interrupted

Damage to the wildcat makes the heavy up anchor process long because the chains and wildcats are no longer eating. This makes the chain that is pulled experience loss and must be pulled slowly, thus making the heavy up anchor process long and can hamper ship operations.

e. Hindering ship operations

Smooth operation of MT ships. Griya Flores may become disrupted because of a problem that should have been anticipated but the implementation was less than optimal. This is due to the length of the heavy up process, damage to the wildcat gear and the corroded condition of the chain.

The authors looked at all the findings that existed while conducting the study and the results, namely from all the impacts that occurred due to the lack of anchor chain maintenance in MT. Griya Flores can cause new problems. It can be concluded that it is very important to carry out anchor chain maintenance activities from an early age and the most important thing is to make maintenance procedures so that the crew, especially the deck department division, understand the appropriate maintenance of the anchor chain. Good maintenance should also be in accordance with the plan that has been made to prevent unwanted problems from appearing.

4. Conclusion

Based on research that has been conducted by researchers on the role of anchor chain maintenance in MT. Griya Flores. So researchers can draw the following conclusions: 1) The absence of making good and correct anchor chain maintenance procedures, such as PMS familiarization, PMS understanding, good PMS implementation, annual maintenance, monthly maintenance, *chain locker* inspections carrying out chain measurements and reporting to the *owner* ships are important to support the implementation of PMS and less than optimal maintenance system plans on board which ultimately have an impact on the maintenance of other infrastructure facilities, such as the non-optimal role of anchor chain maintenance. 2) The non-implementation of a good anchor chain maintenance role in its implementation can cause several impacts that can become a problem on board, such as corrosion, exhaustion of *wildcat* gears, influence on the anchor feeding process, *disrupted heavy up anchor* process and from some impacts that can occur resulting in hampering ship operations.

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