TANK CLEANING PROCESS OPTIMIZATION FOR LOADING TANKS
MT BAUHINIA GUNA CARGO CHANGE

Abstract
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Suboptimal implementation of tank cleaning will produce suboptimal results and can affect loading failure. These less than optimal results are influenced by several things. Tank Cleaning is a tank cleaning carried out on a tanker which serves to reduce the risk of damage to the cargo. Wall wash test is a tank cleanliness test for chemical tankers after completing tank cleaning. In the loading process, chemical tankers must prepare their loading tanks in accordance with the correct procedures. In every process of preparing this tank must always pay attention to the standards that have been determined from the surveyor or based on IMO (International Maritime Organization). When the Chemical ship will load, the ship's tank will be checked by the cargo surveyor, if there is dirt or residual cargo before the ship can be declared a failure in the tank cleaning process and as a result the ship will be ordered out of the Jetty, ordered to re-clean. This causes company losses because there will be delays in the loading and discharging process of the ship and the company gets complaints from the charter party. The method used to carry out the research is descriptive qualitative.

Cutting the time for tank cleaning can result in poor tank cleaning results, poor quality materials also result in less than optimal results, and equipment that lacks maintenance will result in less than optimal tool performance.

When the Chemical ship will load, the ship's tank will be checked by the cargo surveyor, if there is dirt or residual cargo before the ship can be declared a failure in the tank cleaning process and the ship will be ordered out of the Jetty and ordered to re-clean. This causes losses to the company because there will be delays in the loading and discharging process of the ship and the company can get complaints from the charter party. The success or failure of tank cleaning and wall wash tests depends on the discipline of the crew, adequate tools and materials, and procedures that are carried out properly.

Keywords: tanker; tank cleaning; wall wash test

Abstract
Carrying out the implementation of tank cleaning is less than optimal, it will produce less than optimal results and can affect loading failure. This less than optimal result is influenced by several things. Tank Cleaning is tank cleaning carried out on tankers which functions to reduce the risk of damage to the cargo. The wall wash test is a tank cleanliness test for chemical tankers after tank cleaning has been completed. During the loading process, chemical tankers must prepare their loading tanks according to the correct procedures. In each tank preparation process, you must always pay attention to the standards that have been determined by the surveyor or based on the IMO (International Maritime Organization). When the chemical ship is loaded, the ship's tanks will be checked with a cargo surveyor. If there is dirt or remaining cargo in the tanks, the ship could be declared a failure in the tank cleaning process and result in the ship being ordered to leave the jetty and ordered to be cleaned again. This causes losses to the company because there will be delays in the process of loading and discharging the ship and the company will receive complaints from the charter party. The method used to carry out research is descriptive qualitative.

Cutting the tank cleaning time can result in poor tank cleaning results, poor quality materials also result in less than optimal results, and equipment that is poorly maintained will result in less than optimal tool performance.

When the chemical ship is loaded, the ship's tanks will be checked with a cargo surveyor. If there is dirt or remaining cargo in the tanks, the ship could be declared a failure in the tank cleaning process and result in the ship being ordered to leave the jetty and ordered to be cleaned again. This causes losses to the company because there will be delays in the process of loading and discharging the ship and the company can get complaints from the charter party. Whether the tank cleaning and wall wash test is successful or not depends on the discipline of the crew, adequate tools and materials, and procedures that are carried out as well as possible.

Key words: tanker; tank cleaning; wall wash test

1. Introduction

Tankers are a type of ship designed to transport various types of liquid cargo, such as crude oil, chemical liquids, raw or processed gas. Chemical tankers often change their cargo during operation. Therefore, tank cleaning is carried out. Every change of ship cargo is required to do tank cleaning so that the cargo that is unloaded is in accordance with what is loaded at the port and is not damaged, not dirty, and not contaminated with the previous cargo. MT Bauhinia in its operations often loads cargo that is very sensitive to polluting substances, such as methanol and toluene. So it is necessary to conduct a wall wash test before loading. This wall wash test is carried out at the end of the tank cleaning process. When this ship sails from Haugiang, Vietnam to Donghua, China, at this time the Bauhinia ship loads RBD Palm Oil and will load toluene so that the MT Bauhinia ship performs tank cleaning, but there are several tanks that are still less than the maximum tank cleaning
results. This is indicated by the lack of maximum wall wash test results. Therefore, the author draws a problem, namely how the tank cleaning process is carried out and why there are still high chloride levels at the end of tank cleaning and how to overcome these problems.

2. Theoretical Foundation

Tank cleaning is a tank cleaning carried out on a tanker which functions to reduce the tank from cargo residues that are still in the tank after the ship has carried out the unloading process. From this understanding, it is very important that we carry out tank cleaning so that the next cargo is not contaminated with the previous cargo. The correct implementation of tank cleaning can also maintain and maintain the tank.

Wall wash test is a tank cleanliness test for chemical tankers after completing tank cleaning. The wall wash test is carried out to determine the cleanliness of the tank and determine whether the ship is ready to load or not, and determine whether the ship needs to do another cleaning or not. Tank cleanliness testing carried out in this wall wash test is carried out testing the tank wall using pure methanol by spraying it into the tank wall.

A loading tank is an empty room on the deck of a ship that is used to store cargo. The cargo of the tanker must be properly maintained so that it is not contaminated with other cargo. The manufacture of chemical tanker tanks must be specially designed and resistant to the cargo carried due to the nature, type, and danger of the cargo. For example, with a stainless steel coating design.

Palm oil or crude palm oil is a vegetable oil derived from the oil palm plant. This oil is more widely consumed by the surrounding world than other vegetable oils. Crude palm oil (CPO) is obtained from the fruit of the oil palm. Chemicals are liquids that contain pure or already mixed substances made from chemical elements. When you want to use or mix chemicals or chemicals, you must pay attention to the dose, the hazard content and the nature of the material because if it is wrong in the procedure it will cause danger. One of the chemicals or chemicals that will be discussed is toluene. Toluene has the chemical compound C6H5CH3. Toluene is formed by a phenyl ring (from benzene) and 1 methyl group as a substituent. Toluene is used for paint solvents, gasoline additives and raw materials from dyes.

In the wall wash test process carried out by itself, it was still found that there were still loading tanks that still had high chloride levels, which were still above 1 ppm. Whereas for the Toulene standard, the chloride level is below 1 ppm. For this reason, tank cleaning is carried out again in order to get results that meet the provisions.
Loading and unloading on a tanker is a process of moving cargo from the loading bay or ship tank to the stockpile tank of a terminal or vice versa using the ship's pumps and terminal equipment. The implementation of the tank cleaning process must be optimized, especially the tank cleaning wall wash test so that no one is harmed. If tank cleaning is smooth, delays in loading can be minimized and cargo will not be damaged or contaminated with the previous type of cargo. So that the change of cargo can be smooth and produce benefits for all parties, the company gets time and cost efficiency and the cargo owner gets his cargo on time.

3. Research Methodology

This research uses descriptive qualitative research methods. This qualitative research conducts research that is oriented towards something that is natural. Therefore, this research is basic and naturalistic or naturalistic, and can only be done in the field directly. This research method is usually used and implemented by researchers in the field of social sciences, including education.

There are 2 types and sources of data in this study, namely primary data and secondary data. Primary data is a data source that directly provides data to data collectors. Secondary data is an indirect source of data in providing data to data collectors.

The data collection techniques used in this study are observation, interview and documentation methods. Observation is a daily human activity using the five senses, especially the five senses of the eye. Research observations with this sense of sight aim to see direct events that occur in the field and see events that run directly, and can analyze events that exist at the time. interviews are question and answer activities carried out by
two people in order to get the data needed. Documentation is a method of collecting data by analyzing and looking at documents that are made by yourself or that already exist.

The writing of this applied scientific work uses 3 kinds of data analysis methods, namely data reduction, data presentation and drawing conclusions. Data reduction is summarizing, selecting important things, determining the main thing, and focusing on important things and eliminating something that is not important. Data presentation is the process of organizing data in detail from various information so that it is easy to understand. Drawing conclusions and verifying data is the final stage in research that uses qualitative data analysis.

4. Research Results

The tank cleaning process carried out by the MT.Bauhinia crew is as follows, namely

a) **Free Wash** is the process of spraying the walls of the loading tank using *sea water* or *fresh water* depending on the previous load using a machine called *butterworth*.

b) **Cleaning**, in this process, spraying is carried out again on the walls of the loading tank using hot water with a temperature of around 60-70 degrees Celsius for cleaning *RBD Palm Oil*, because this cargo is not too frozen and not diluted. Then filling *sea water* into the tank as much as 1 foot or about 30 cm. Then the detergent used is added.

c) The *rinsing* process is carried out using *butterworth*. During this process, the *drop valve* is opened and closed to allow circulation, so that the inside of the drop lane is flushed. This circulation uses a horn which is then channeled using a hose to the butterworth. The *rinsing* process is carried out for approximately 30-60 minutes.

d) **Flushing** is the process where flushing is done. Flushing is carried out in 2 stages, namely the first using sea water if it is considered clean and there is no soap then flushing is carried out using fresh water.

e) Stripping is drying the water in the loading tank, by pumping the water in the tank with a cargo pump until the water is completely gone or minimizing the presence of water in the tank.

f) The gas free fan is drying the loading tank, this is done so that the water drops into the tank and gathers around the bellmouth, so that later the remaining water can be dried in the next stage.

g) Drying is the process of removing the water around the bellmouth so that there is no remaining water in the tank. This is done with a willden pump.

h) Mooping is the draining of the tank of the remaining water that cannot be pumped with the *wilden pump*. This drying is done using an existing cloth or rag.

The *wall wash test* is conducted before the *drying* process and after the *gas free fan*. This test is carried out independently by the Chief Officer first by spraying pure methanol for sampling and then testing. If the results fail, the tank wall must be sprayed using
distilled water, after which the tank wall is rubbed with teepol, and then sprayed again with distilled water. This is done until the wall wash test is successful and the ship is ready to be docked. If the wall wash test results still fail, the crew must re-clean the tank until it is as requested.

Samples for the wall wash test were taken from spraying the tank walls with pure methanol and collected in prepared bottles. The wall wash test was conducted independently including:

Hydrocarbon test is to check the condition of the tank for hydrocarbons. For the hydrocarbon test sample analysis comparison is 1:1. This means that 50cc methanol sample + 50cc distilled water is then shaken until mixed for about 15 minutes, for the standard hydrocarbon test the same thing is done, namely 50cc pure methanol + 50cc distilled water.

Chloride test is checking the tank for chloride levels in the tank. For sample analysis, the standard chloride test is:

<table>
<thead>
<tr>
<th>PPM</th>
<th>Methanol</th>
<th>2% AgNO3</th>
<th>20% HNO3</th>
<th>10 ppm CL standard</th>
<th>Distilled water</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25 ppm</td>
<td>50 cc</td>
<td>2 cc</td>
<td>2 cc</td>
<td>1 cc</td>
<td>45 cc</td>
<td>100 cc</td>
</tr>
<tr>
<td>0.5 ppm</td>
<td>50 cc</td>
<td>2 cc</td>
<td>2 cc</td>
<td>2 cc</td>
<td>44 cc</td>
<td>100 cc</td>
</tr>
<tr>
<td>1 ppm</td>
<td>50 cc</td>
<td>2 cc</td>
<td>2 cc</td>
<td>4 cc</td>
<td>42 cc</td>
<td>100 cc</td>
</tr>
<tr>
<td>2 ppm</td>
<td>50 cc</td>
<td>2 cc</td>
<td>2 cc</td>
<td>8 cc</td>
<td>38 cc</td>
<td>100 cc</td>
</tr>
</tbody>
</table>

Making standard chloride test samples depends on the ppm determined by the cargo surveyor. For the manufacture of sample testing from the tank, namely:

50cc methanol sample + 2cc 2% AgNO3 + 2cc 20% HNO3
+ 46cc distilled water

The way of testing hydrocarbon and chloride tests is that the standard test is juxtaposed with the results produced by the sample being tested. If the results are the same or even cleaner it will be declared successful and if the results are dirtier it will be declared a failure.

Table 2. Causes of high chloride levels
<table>
<thead>
<tr>
<th>No.</th>
<th>Factors</th>
<th>explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Man</td>
<td>The Bauhinia bosun crew and Bauhinia helmsman were so confident that they would succeed with one <em>cleaning</em> because of their experience that they ignored the prescribed <em>procedures</em>.</td>
</tr>
<tr>
<td>2</td>
<td>Material</td>
<td>The resin available on board is limited, so it is very economical to reserve supplies, because at that time there was no <em>fixed</em> information that the ship only loaded <em>toluene</em> or additional cargo, so at the time of <em>cleaning the</em> resin was prepared for backup if other loading tanks would be used.</td>
</tr>
<tr>
<td>3</td>
<td><em>Machine</em> (tool)</td>
<td>Lack of maintenance of <em>tank cleaning</em> equipment on board so that rust is found which prevents <em>butterworth from</em> working properly.</td>
</tr>
<tr>
<td>4</td>
<td><em>Procedure</em> (Steps)</td>
<td>Due to confidence and underestimation of work, there was an error in the procedure carried out in cleaning the loading tank.</td>
</tr>
</tbody>
</table>

Therefore, optimization will be carried out on the process that occurs by means of

1. Remind each other and maintain communication between teams. As the Chief Officer in charge, you must always monitor the *tank cleaning* process to avoid cutting the procedure time.
2. Carry out maintenance of equipment on board, especially *tank cleaning* equipment, because this is related to the ship’s operating process.
3. The materials used in the *tank cleaning* process are of high quality and sufficient supply in the *tank cleaning* process. Using the right amount of ingredients will produce good results.
4. Perform *tank cleaning* procedures that have been determined by the leadership.
The causes of failure in tank cleaning activities on MT Bauhinia which will load toluene in Donghua, China are:
1) Lack of soap circulation time in tank cleaning activities
2) Damage to one of the butterworths in the loading tank which resulted in tank cleaning not being carried out optimally.
3) Heater on board emits temperatures below procedure and takes a very long time to emit heat.
4) Limited resin available on board
5) Poor quality distilled water
6) Underestimation of the type of cargo being cleaned

5. Cover
The success or failure of a job is related to discipline and teamwork. In addition, materials and equipment also support the implementation, and there are procedures that must be adhered to and done well.