



A REVIEW: ON OIL SKIMMER BY USING NON-POLAR PIPE

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Abstract: There are a lot of import and export transactions taking place these days. Due to the growth of commerce and the widespread use of sea shipping, which is the least expensive method, there have been several instances of oil spills in the ocean. Large-scale oil spill incidents have occurred throughout the world and have had a significant impact on both industry and ecosystems. Many sea mammals and birds perished as a result of these oil spills. After an oil spill, a slick (a thick layer of oil) is left behind, ensuring that sunshine and oxygen can reach the sea. Because of the absence of oxygen and sunlight, it has an impact on life below the ocean. Because some oils are hazardous and poisonous, coming into physical contact with them can be quite harmful for people as well. There are different types of oil skimmers in use as a response to these oil spills. Belt, pipe, rope, and drum types are a few examples. These are all employed in the cleanup of spilled oil. In order to understand how oil skimmers function most efficiently, Nemours conducted a thorough literature review study in the subject of oil spill recovery. This study is entirely based on the methods used to clean up spilled oil.

Index Terms - Oil Skimmer, Polar Pipe, Skimmer belt, Water Pollution, Oil Recovery.

I. INTRODUCTION

Pollution is the greatest threat to the environment. Human beings, Oil pollution is the most hazardous of these pollutants because it poses a threat to the ecosystem as well as as economics. Recent research has been done regarding the rising use of oil. The Environmental Protection Agency reports that there are around 14000 oil spills in the oceans alone each year. Many nations have established strict safety standards for the disposal of waste water containing oils, most often from petrochemical and process industries, so that these industries are outfitted with these types of oil skimmers to separate the oils from disposal water. The tool used to remove oil floating on a liquid surface is known as an oil skimmer. Depending on the specific design, they are employed in a variety of applications, including the clean-up of oil spills, the treatment of oily water, the removal of oil from coolant and aqueous part washers, and the collection of fats, mixed oils, and grease oil in waste water treatment facilities. And viscosity are just a few of the physical characteristics of oil that have a significant impact on how quickly it spreads or forms an oil slick. Most oils have a lower and smaller density than water, which makes them float, lie flat on the water's surface, and attempt to spread and expand horizontally. This density was a key component in predicting and determining how the oils would behave in water. Due to the lighter materials and chemicals evaporating more quickly due to the lower density of oils, heavier items that sunk in the water column and reacted with water or other compounds in seawater to generate harmful sedimentation on seawater bodies were left behind. The pace at which oil spread was measured using an index of oil viscosity. The increased viscosity of the oil that generated the information about the chocolate mousse makes it tough to degrade or treat. The oil spill became a semi-solid at temperatures greater than the freeze point, making the clean-up plan challenging and complex. Oil pour point was thought of as a function of temperature.

The solubility of oil in water was between 28 and 31 mg/l and was low in relation to the pollutant and bioremediation. It also depends on temperature and the chemical makeup of the hydrocarbon. However, oil surface tension was inversely related to temperature, so it spread more quickly in warmer waters. This index also affected how quickly oil spread even in the absence of wind or water currents.

II. OBJECTIVES

- After placing the components parts in their respective places we started the machines and tried to extract the oil. As oil being lighter in density floats on the water and allows the pipe to get soaked in oil instead of water.
- The pipe actually soaks oil instead of water and brings it to the sponge. Sponge soaks the oil from the surface of the pipe and slides on to the plate and then the oil is collected in the container.
- We noted down the amount of oil soaked in respective amount of time. The skimmer actually recovered almost 75% - 80% of oil from the water surface. At the starting the oil recovery rate is very high and as the time passes the oil recovery becomes a bit slow but recovers all the oil. The process is time consuming but shows effective results when comes to recover oil from the water surface.

III. LITERATURE REVIEW

[According to studies by Thombare Babasaheb B.1 (2018) in their article titled "A Review on Analysis of Belt Type Skimmer," according to the polar and non-polar properties of oil and water, water is made up of polar substances like H⁺ and OH⁻ while acting as a non-polar substance is oil. As a result, they do not mix, and the oil floats on the water rather than sinking. They discovered that because oil is less dense than water, it floats. They chose a non-polar substance for the belt, which is why the oil is drawn to the belt. They used materials for belts such as cotton, rubber, steel, oleophilic etc. They used the substance that was stickier than water this causes the belt to absorb oil more readily than water. In their paper, they came at this conclusion.

Mamta Patel (2015), has studied in her paper as named "Design and Efficiency Comparison of Various Belt Type Oil Skimmers". They discovered that the skimmer can remove roughly 60–70 liters of oil each day. They came to the conclusion that the polyurethane belt works well and efficiently to remove oil. They even claimed that the polyurethane belt is more favourable to use in situations when there is less need for clamour activity. They conducted a practical in which they experimented with multiple belts (made of various materials) and came to the conclusion that the polyurethane belt has a greater potential for oil recovery.

Sathiyamoorthi V1 (2018) in their essay titled "A review on mobile oil skimmer" regarding the oil recovery efficiency and capability. They discovered that, among other factors, the belt speed, belt inclination angle, thickness of the oil slick, and the belt speed are the most crucial ones. They looked into how the oil and water droplets are collected. Therefore, it needs to be lowered for the skimmer to function effectively. Oil removal efficiency can be increased by using a stirrer mechanism. In order to remove the oil from the contaminated area, different processes utilising booms, dispersants, and skimmers have been created. Oil water separators or any other sorbent materials may also be used to separate it. They led to the standard oil's design being improved. Utilizing a skimmer belt and moving the skimmer towards the belt shaft greatly increase oil recovery efficiency and make assimilation easier. They concluded, in essence, that an efficient skimmer can boost its rate of oil recovery through correct design and material selection. The belt's angles and speed both contribute significantly to the skimmer's high efficiency.

Rafi Jamal Algawi¹ (2014) Has found that the oil recovery rate rises as the belt rotating speed rises in their article titled "Study of Operating Conditions for Oil Skimmer Apparatus from Water." As belt rotational speed rises, the effectiveness of oil recovery declines. They even found that while oil temperature drops reduce oil efficiency rate, oil temperature decreases boost oil recovery rate. According to the research, oil viscosity is a key factor in oil recovery utilizing an oil skimmer. By increasing the viscosity, a lower temperature raises the oil recovery efficiency and rate. They even came to the conclusion that the water's PH has a big impact on the oil since it alters the physical characteristics of the oil, making it challenging to collect. They even came to the conclusion that the belt material utilized on the skimmer plays a significant effect in how well the skimmer recovers oil. In brief, they came to the conclusion that the oil recovery rate as well as the oil recovery efficiency of the skimmer can alter depending on the viscosity of the oil, belt material, and surrounding atmosphere of the oil spillency by boosting viscosity.

IV. METHODOLOGY

There is an itching need to recover these oil spills before it is too late to even react toward it. There are various methods of removing the oil that has been spilled on the water surface.

What is oil skimming?

It is the process of removing or separating the oil from the oil polluted coolant or oil from the surface of water.

There are various methods to do so, those methods are:

By separating the oil from the coolant by aggressively pouring the upper layer of the mixture in another container.

By soaking the oil layer using oil soaking elements.

By skimming oil using different types of oil skimmers.

These are the various methods, but among these effective one is the oil skimmer.

V. CONCLUSION

As we have learned from all of the study work, there are some significant factors and considerations that must be taken into account while building an oil skimmer. The first thing is the skimmer's design elements. The belt's rotational speed is also crucial, as is the material that was employed. The smallest modifications to the skimmer's design could have a significant impact on how well it recovers oil. The belt must be made of a polar substance in order for the non-polar oil to adhere to its surface. The positioning of the skimmer's component pieces should be done carefully, which is the other vital aspect, and the rotational speed of the belt to get effective oil recovery efficiency from the skimmer.

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