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Solar Operated Oil Skimmer

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ABSTRACT: Manufacturers are frequently asked to streamline procedures and boost productivity. These requests might be necessary to boost throughput, likelihood, or to work around financial constraints. For these reasons, it is frequently necessary to update the procedures that make use of oil skimmer equipment. Design modifications should be made to boost productivity, lower equipment costs, and lower total costs. To stop the dangerous impacts of an oil spill, governments and more industries need to be persuaded to utilise oil skimmers. There are various types of oil skimmers in use as a countermeasure to these oil spills. Belt, pipe, rope, and drum types are a few examples. These are all employed in the clean-up of spilled oil. To understand how oil skimmers function most efficiently, Nemours studies in the field of oil spill recovery undertook a thorough literature review study.

This study is entirely depended on the methods used to clean up spilt oil.

KEYWORDS: oil spillage, water pollution, oil recovery, belt oil skimmer, disc,

I. INTRODUCTION

Oil skimmer is a mechanism used for collecting oil that is floating on liquid surfaces. Depending on the exact design, they serve for a variety of purposes, including the cleanup of oil spills, the treatment of oily water, the removal of oil from coolant and aqueous part washers, and the collection mixed oils, and greases for wastewater treatment. The various methods that are used while implementing an oil skimmer belt to filter oil from water. It is a mechanical device that assists in eliminating greasy particles and floating oil from water.

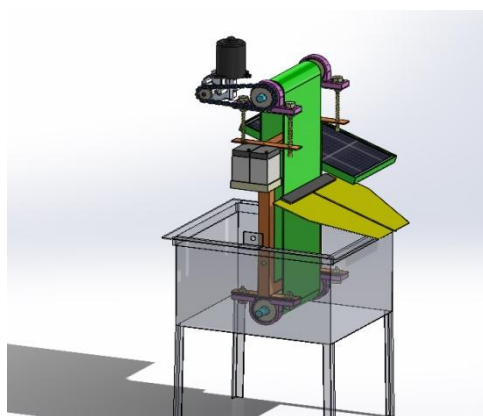
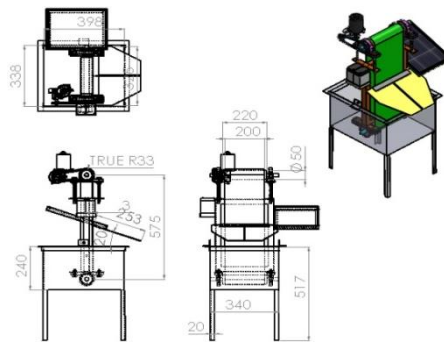


Fig.1 Oil Skimmer

The technique's underlying skimming principle is reliant on three physical characteristics of oils: specific gravity, surface tension, and affinity. Since most oils have a lower gravity than water, they can separate from the liquid and float to the surface without being stirred up. An oil skimmer can be used to gather these oils. Other oils behave differently; if the water is not stirred, they settle to the bottom and must be removed using methods other than skimming. Due to the surface tension and oil's attraction, the light oils that can be skimmed from the water surface can gather.



Design Set-Up

II. OBJECTIVES

- To provide it a basic and high operating capability while simplifying the sophisticated driving mechanisms employed in earlier designs. To develop a device which requires No advance training
- To reduce ocean oil pollution as much as possible.
- To evacuate the water and oil mixture from the workshop and garage.
- To reduce the duration of the whole procedure and the production cycle.
- To reduce labor cost
- Another objective of the project was learning how to work the different parts of oil skimmer and achieve its optimum working.
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III. LITERATURE REVIEW

A M Najar and colleagues report that it is now standard procedure to recover oil that is slicking the water's surface using disc skimming equipment. However, the performance of these devices depends on a wide range of factors, and it is undoubtedly not fully understood. The performance of model skimmers may be tested thanks to new experimental methodologies, which are described in this paper. This has made it possible to assess the significance of the different factors in a way that is more organised and thorough than ever before. Several improved disc skimming devices are addressed in light of a better knowledge of the flow behaviour inherent in the oil collection process. Results for these systems are reported in order to demonstrate the possibilities of the novel disc skimmer types when used as oil recovery equipment [1]. build a milling machine that can travel along any curve when a stylus is moved along it on an existing object. We can create a descaled clone of the object using this type of manipulator, or we can refer to it as a copying machine that can be used in mass manufacturing at a low production/machining cost. This manipulator's 3-DOF offers the ability to change the engraving's depth, making it useful for woodcarving and metal engraving businesses who want to replicate carved wooden designs. At the end-effector, we can swap out the cutter for a welding flame or a paintbrush to easily and precisely carry out the desired typical activity. Its weak dynamic performance is the only restriction, but our kinematic research reveals that it is ideal for light- and slow-speed operation. Oil spill recovery using a rotating drum skimmer was experimentally explored for a wide range of design and operating parameters by A. H. Hammond et al. Regarding the oil recovery rate of the drum skimmer, the influence of the drum's diameter, length, rotational speed, oil layer thickness, oil characteristics, and drum centre height above the oil/water interface surface were examined. During this experiment, crude, diesel, SAE 10W, and SAE 140W oils were used. The oil recovery rate was discovered to improve with increasing drum diameter, drum length, drum centre height above the oil/water interface, and oil slick thickness as well as oil viscosity, density, and surface tension. The findings showed that the drum skimmer is a useful tool for cleaning up spills of low viscosity oil, such as light crude oil, which accounts for the majority of serious spills and marine pollution. The oil recovery rate of the gadget is also predicted using an empirical equation. The equation provides good agreement with the observed data and can be used with various oils.

According to Suraj Nair et al. [3], there have recently been two severe oil spills in Mumbai that have affected the majority of the local aquatic life. This spillage also had an impact on the fishing and tourism industries. Given that this is a current global issue, the repercussions of such oil spills on the ecosystem are not insignificant. 100 million US gallons of oil spill per year. This is equivalent to 100 large-sized gyms. However, due to the large number of oil spills,



the statistics could not accurately reflect the devastation that was actually done to the ecosystem. Therefore, a practical method to remove the oil from the surface without wasting it is required. Oil skimmers are now used in industries to separate oil from other substances such as coolant and water. There are many ways to do this, with the disc type oil skimmer being one of the more popular [3]. The goal of this initiative, according to Tushar Pathare et al., is to eliminate the oily effluent from the wastewater. Industries have faced many challenges as a result of pollution. Wastewater that has had the oil removed is now free of oil contamination. There are three types of oil skimmers that are frequently used: weir, oleophilic, and non-oleophilic. Oleophilic skimmers can be identified by the component (rope, disc, belt, or drum) that is utilised to gather the oil, rather than by how they function. Even a thin floating oil layer in the water can be removed by it. The "oleophilic material" employed in the belt is mostly to blame for this. To recover oil that has been spilt from surface water, a free-floating endless belt oil skimmer was created. The skimmer makes use of a special, high-efficiency belt that is powered by a motor. We can preprocess water for additional uses by removing oil from it. This can reduce pollution brought on by oil spills and prevent water waste. The majority of the industrial oil that is wasted today enters ponds, rivers, and the ocean. As a result, national and international environmental standards are becoming more stringent. It is practical to produce a cheap machine that complies with these standards.

IV. COMPONENTS

I. Shaft:

A spinning machine component called a shaft is used to transfer power from one point to another. The shaft receives the power from a tangential force, and the torque (or twisting moment) that results from that force is set up inside the shaft, allowing the power to flow to various machines that are connected to the shaft. Mild steel is the material often used for a regular shaft. Ordinary shafts are made of carbon steel in the grades 40C8, 45C8, 50C4, and 50C12.

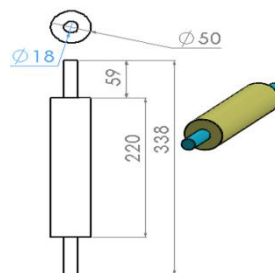


Fig.(a) Shaft

II. Belt:

The belt must be designed from a material that makes it easy to elevate the oil above the head and pour it on the blade. By letting its components follow their fundamental qualities, the oil is lifted through the belt. Belt materials are chosen based on their polar and non-polar characteristics. Oil interacts as a non-polar element because it lacks polar molecules, whereas water has polar molecules like H⁺ and OH⁻. Both polar and non polar molecules are attracted to and from bonds with their elements.

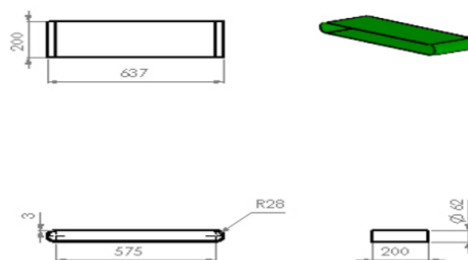


Fig.(b) Belt

III. PEDESTAL BEARINGS

A pillow block is a pedestal used to provide support for a rotating shaft with help of compatible bearings & various accessories. Housing material for a pillow block is typically made from cast iron or cast steel. A pillow block usually refers to a housing with an included anti-friction bearing. A pillow block refers to any mounted bearing wherein the mounted shaft is in a parallel plane to the mounting surface, and perpendicular to the centre line of the mounting holes, as contrasted with various types of flange blocks or flange units.

P=pedestal bearing
 2=spherical ball or deep groove ball bearing
 =04=5 × 4 = 20mm
 Bore diameter of bearing,

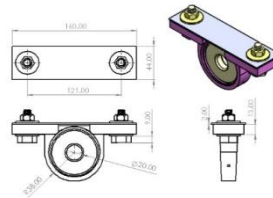


Fig.(c) Pedestal bearings

IV. DC MOTOR

This motor has a worm gearbox and is PMDC. The wiper motor has a standard voltage requirement of 12 volts DC. It is safe to assume that the motor can withstand up to 13.5 volts without facing any issues because the electrical system in a functioning car typically outputs between 13 and 13.5 volts. The motor needs a minimum current of 1.6 amps at 70 rpm, 0.9 amps at 41 rpm, and up to 4 amps if you choose to run it at 106 rpm. Electrical energy is converted to mechanical energy by direct-current motors. They operate equipment including hoists, fans, pumps, punch presses, and automobiles. These devices could either have a very variable torque-speed characteristic or one that is clearly defined.

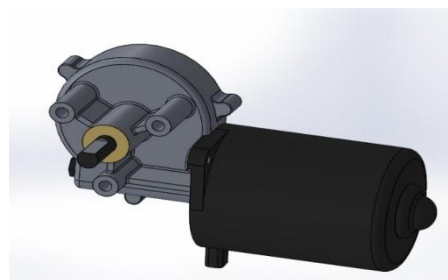


Fig. (d)DC Motor

V. CONCLUSION

The technological underpinnings of industry include separation procedures as vital components. Separation processes offer prospects for waste reduction and increased efficiency in addition to its significance in industrial operations. removing waste oil from water, preventing environmental and financial issues. Comparatively, a belt skimmer produces the best results. Considering all the limitations, the separator has a very simple design and is highly reliable. The trial conducted demonstrates that the design achieves its goals. It is discovered to be incredibly practical for the operator to skim the oil. Operators greatly benefit from it since it spares them the time-consuming task of skimming the oil and grease from the waste water.



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