

Design and Fabrication of Oil Skimmer

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Abstract: Oil skimmer is used to remove the floating oil from liquid medium. The oil floats on the water since it has less density than water. The water molecules are more attracted to each other than oil molecules since they don't mix each other. Here we use the skimming medium as Belt & Metal disc. The skimming medium runs over the surface of water in which oil brought out with little amount of water. The main purpose of this fabricated skimmer is to purify the water from various dirt oils. The skimmer is more cost efficient and simple in design in comparing to costly treatments like membrane filters and chemical treatments. The oil is removed from the metal disc and belt through wiping blades. The floating grease or oil has formed into solid mats our apparatus can be used to break the mats and remove them. This will reduce water pollution.

Index words :- Oil recovery, disc and belts, water pollution.

I. INTRODUCTION

Oils skimming : Oil skimmer are the cheapest and most efficient way to remove surface oil in ocean ,washing machines and leakage oils from coolant machinery etc. A belt and disc skimmers are great in many ways. The capacity is high and oil collection rate is excellent oil skimmer is easy to install. Oil skimmer is effective tool for removing dirt oil from water. A oil skimmer achieve the desired level of water purity. In more demanding situation oil skimming is a cost reducing means of removing most of the oil before using costly treatments such as chemical process. The skimming principle, upon which the technique relies, is depend on three physical properties of oils, namely specific gravity, surface tension, and affinity. A number of factors are to be taken into account when selecting skimmers but the most important aspects to consider are the Viscosity and adhesive properties of the oil intended to be oil skinned.

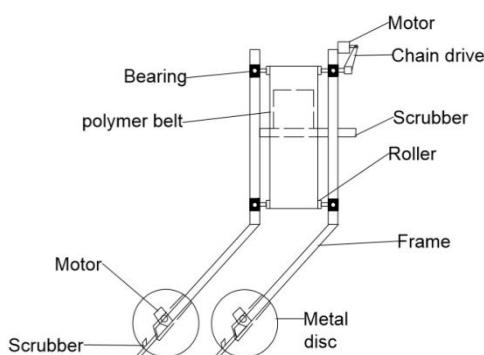


Fig. 1 Oil skimmer design view



Fig. 2 our fabricated view of oil skimmer

II. LITERATURE SURVEY

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III. METALS AND FLOATING MATERIAL USED IN FABRICATION

(1) Mild steel or Plain-Carbon Steel:

Mild steel contains approximately 0.05-0.25% of carbon making it malleable and ductile. Mild steel has a relatively low tensile strength, but it is cheap and easy to form; surface hardness can be increased through carburising.

(2) Polymer

Polymer is a large of molecules , or macromolecule, composed of many repeated subunits. Because of their broad range of properties ,both synthetic and natural.

(3) Float material:

The materials that can be used as floating materials should have a density less than that of the density of water. The commonly used floating materials are foam, pipes which have the density less than water density such as HDP, PVC pipes.

IV DRIVES

[1] BELT DRIVE

A Belt is a loop of flexible material used to link two or more rotating shafts mechanically , most often parallel. Belts may be used as a source of motion, to transmit power efficiently or to track relative movement. Belts are looped over pulleys and may have a twist between the pulleys , and the shafts need not to be parallel.



Fig.3 Belt drive view

[2] CHAIN DRIVE

Chain drive is a way of transmitting mechanical power from one place to another. It is often used to convey power to the wheels of a vehicle, particularly bicycles and motorcycles. It is also used in a wide variety of machines besides vehicles. The power is conveyed by a roller chain, known as the drive chain, passing over a sprocket gear, with the teeth of the gear meshing with the holes in the links of the chain. The gear is turned, and this pulls the chain putting mechanical force.

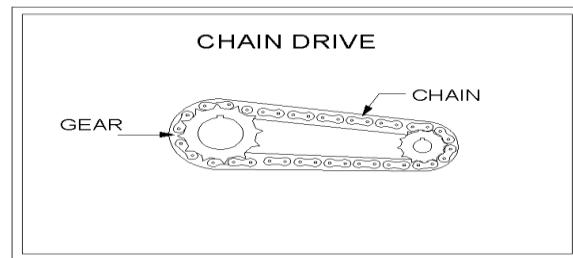


Fig.4 Chain drive view

V. LIST OF COMPONENTS

Bearing	- 19.05 mm
Solid shaft	- 19.05 mm
Polymer belt	
PVC pipe	- 89.5 mm
Gear wheel	- 3/8 chain drive sprocket
12V DC motor	- 60 rpm
Metal disc	- 3mm thickness, 25 mm dia

VI. DESIGN PROCESS

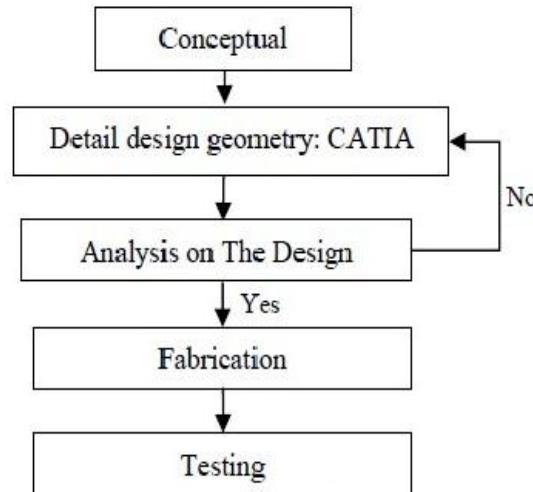


Fig 5. Design process of oil skimmer

VII. WORKING OF OIL SKIMMER

Polymer belt is fixed on the roller with bearing support and it is adjusted for stiff roll on. The roller shaft is attached with gear wheel at one end. A DC motor which is fixed at the top of the frame is fitted with gear wheel. Both the gear wheels are attached through chain for rotating the belt setup. The other end is clamped with DC motor and metal disc. The motor shaft is coupled with metal disc through a coupler. The frame is fixed with PVC pipes surrounding them which helps the frame to float on the water. Both belt and disc are fixed with wiping blades which helps in separating the oil. The motors are connected with the battery the motor rotates the belt and disc simultaneously. The rotating disc and belt over the surface of water will suck the oil spread over the surface of the water. The oil is pulled out and they are separated by means of scrubbing pad. The collected oil is transferred through a port to the collecting chamber. thus the oil is collected from the water surface and separated with help of the wiping blades attached to the frame.

REFERENCES

- (1) 'Victoria Broje' and 'Arturo A keller' , "improved recovery of oil spills from water surfaces using tailored surface in oleophilic skimmers , Donald Bren school of Environmental Science & Management , University of California , Santa Barbara.
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IX. COST ESTIMATION

(1) LABOUR COST:

Lathe, drilling, welding, grinding, power hacksaw, gas cutting cost

(2) OVERHEAD CHARGES:

The overhead charges are arrived by "manufacturing cost"

$$\text{Manufacturing Cost} = \text{Material Cost} + \text{Labour Cost}$$

$$\text{Overhead Charges} = 20\% \text{ of the manufacturing cost}$$

(3) TOTAL COST:

$$\text{Total cost} = \text{Material Cost} + \text{Labour Cost} + \text{Overhead Charges}$$

VIII. CONCLUSIONS

The apparatus thus helps in removal of high grade oil from the surface of water in seashore and rivers. The water pollution is majority reduced by the setup. They minimize the human efforts in oil removal process. The direct contact of human with these high grade oil will affect them physically. The setup will eliminate those kind of problems. The fabricated project is simple in design and economically in cost wise. The volume of oil removed can be improved by using large size belt and disc which results in effective oil removal rate.