

OIL SPILL RECOVERY EQUIPMENT BY USING POLYURETHENE BELT DRIVE

S.Ashrali¹ C.Ramesh Kumar² M.Balaji³ N.A.Gokula Krishna⁴ S.Sabarinathan⁵

¹Final year Mechanical Engineering, Sengunthar Engineering College, Tiruchengode.

² Assistant Professor, Department of Mechanical Engineering, Sengunthar Engineering College, Tiruchengode.

³ Final year Mechanical Engineering, Sengunthar Engineering College, Tiruchengode.

⁴ Final year Mechanical Engineering, Sengunthar Engineering College, Tiruchengode.

⁵ Final year Mechanical Engineering, Sengunthar Engineering College, Tiruchengode.

ABSTRACT

In this era of modern civilization, liquid fuel transport is mandatory around the world. But there has been several oil spilling accidents around the world and their negative effects are against all the living elements. In the last decades Bangladesh face such problem randomly in sea area and as well as in the river side damaging a large number of livings alongside the river having a badly effect on the entire ecology. The local residents collect the spilled oil manually. The system is less efficient, slow and health hazardous. Mostly belt using Polymer, Teflon, Elastomer, Corrosion Resistant Steel materials belt are widely used for recovery of this oil. However, they are costly and unavailable. In this work a low cost simple blanket belt device by using locally available equipment that will be capable to absorb the spilled oil rapidly from river water that is filled with animal and plant waste. After constructing such oil recovery system, the performance is evaluated that accomplish two types of oil having different physical properties. Experimental analysis gives around 190 litre/hour of Sample-1 oil whereas absorption rate for the Sample-2 oil is around 253 litre/hour for the constructed device with minimum cost compare to the other conventional belt oil skimmer.

I. INTRODUCTION

Oil is one of the precious crude and being used in many routine application of human life. Since most of the oils are toxic so quite dangerous for alive when it comes to direct contact with them. During the years of recent decades, world has witnessed many oil spillage tragedies and subsequent damage to alive and environments. Many countries has made stringent safety norms for waste water disposal contained with oils mainly typically from petrochemical and process industries so that such industries are equipped with such kind of oil skimmers to separate the oils from disposal water. The continuous removal of oil from process fluids increases the life of the fluid.

II. MAJOR COMPONENTS

1. SPUR GEAR
2. FRAME
3. SHAFT

4. METAL STRIP
5. BEARING
6. D C MOTOR
7. BATTERY
8. SHEET METAL
9. CONVEYOR BELT
10. CONVEYOR ROLLER

III. CONSTRUCTION

In this machine belt nylon-fiber plays important role the endless belt rolls over the roller smashing over the surface of the coolant picking up the oil at the upper layer. The belt is power driven using the gearbox and electric motor as the prime mover. The drum & belt assembly rotates along with shaft. The shaft is placed in the bearing housing with the bearing. These bearing are bolted to the main body. There is slot provided in the bearing housing for true alignment of drum. Drums are placed close to each other at some considerable distance inclined with each other at an angle of 180° to increase oil contact surface. Catching power of the belt and its capacity depends on the circumferential distance at of the roller or the drum shell, with this the belt is able to attract the oil only towards it and thus separation of oil layer is possible. The tray with flow mouth is placed beneath the drum scribing plate provided in front of drum shell & is fixed by fixing Knobs. The roller is placed as shown in assembly drawing.

IV. EXPERIMENTAL DESIGN

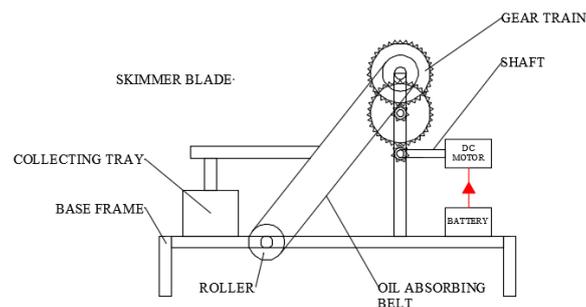


Fig. Layout of Oil Spill Recovery Equipment

V. WORKING PRINCIPLE

The coolant fluid mixed with oil that loose from the lubricated components such as guide ways or reciprocating components is required to be separated. Most of the machine tools such as all types of grinding machine, automates milling machine etc. the coolant after flowing over the cutting edges, looses its quality due to the mixing of oil. Also it spoils the pump or conveying pipe lines. The coolant is made to flow in to the collecting tank. From there it is attracted towards drum-belt surface when it flow over the surface with the roller. The

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upper rollers are actuated with the help of setscrew to raise or lower down to tighten or loosen the belt. Oil in the coolant container tank floats at the upper layer is separated and sticks up to the belt due to adhesion between the belt material and the sticky property of the oil. It is then collected in the tray and another tank (container) and pure coolant is again re-circulated for its use in machine tool.

VII. ADVANTAGES

- No external power is needed of skimming when used with solar power
- It reduces oil pollution of sea.
- Construction is simple.
- Less cost consumption, since the components used are easily available in markets.
- Less maintenance is enough.

VIII. CONCLUSION

Spill prevention is the best possible strategy for oil spill response. The conventional spilled oil removal process is manual. So these are harmful to the human health as well as time consuming. After being concerned with the related problem with the spilled oil and the costly belt oil skimmer, a single Blanket belt economic oil skimmer construction project has performed. Due to the scarcity of the oil skimmer belt replacement materials, locally found new or used blanket that used for warming is employed successfully for recovery of spill oil in an artificial tray model. The work clearly demonstrates that blanket has a miraculous ability to clean up oil spills and its properties must be put into application. The projected oil skimmer belt can skim major portion of oil at steady and gentle flowing water up to 2 cm layer. The replacement of the conventional belt with blanket belt radically lowers the maintenance cost and easy availability. The design and construction of the project is simple thus easy to moderate it for the several conditions as required.

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