

## **FABRICATION AND ANALYSIS OF BELT TYPE OIL SKIMMER**

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*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. The environmental effects of such oil spills are not negligible as this is a global problem now days. So there is need of an effective way to clean this oil from the surface without actually wasting it. This paper represents the project work carried on fabrication and analysis of belt type oil skimmer. We have developed a compact mechanism for collection of oil from water with the help of belt in minimum period of time. Collected oil can be reused for many purposes. This oil skimmer is invented because of low cost, high compatibility, and for rough usage. This set up uses the DC motor, fiberand fabric belt, pulley, supporting frame, scraping blade. We have made changes in the existing machine to make its application easier at reduced cost. Our main aim is to reduce cost and control pollution, attained through this Project work. Now, in industries, to separate oil from other things like coolant and water, we use oil skimmers.*

*There are various methods for this, of which belt type oil skimmer is one of the majorly used. After fabrication of such oil skimmer, the performance is evaluated on the basis of oil recovered from the oil-water mixture and recovery rate for different types of oils.*

*Keywords— Analysis of belt type oil skimmer, supporting frame, scraping blade, fabrication of oil skimmer, recovery rate*

### **I. INTRODUCTION**

Oil skimmers are pieces of equipment that remove oil floating on the surface of a fluid. In general, oil skimmers work because they are made of materials to which oil is more likely to stick than the fluid it is floating on. At the same time, the fluid has very little attraction to oil skimmers. . Floating oil and grease cling to skimming media more readily than water, and water has little affinity for the media. This allows skimming media in the shape of a belt, disk, drum, etc. to pass through a fluid surface to pick up floating oil and grease with very little water. This oily material is subsequently removed from the media with wiper blades or pinch rollers. Oil skimmers are simple, dependable and effective tools for removing oil, grease and other hydrocarbons from water and coolants. Often, an oil skimmer by itself can achieve the desired level of water purity. In more demanding situations, oil skimming is a cost-effective means of removing most of the oil before using more complicated and costly treatments such as coalescers, rmembrane titters and chemical processes.

### **II. LITERATURESURVEY**

We are known that of oil skimmers topics at different types there are given below,

1. Drum skimmers
2. Weir skimmers

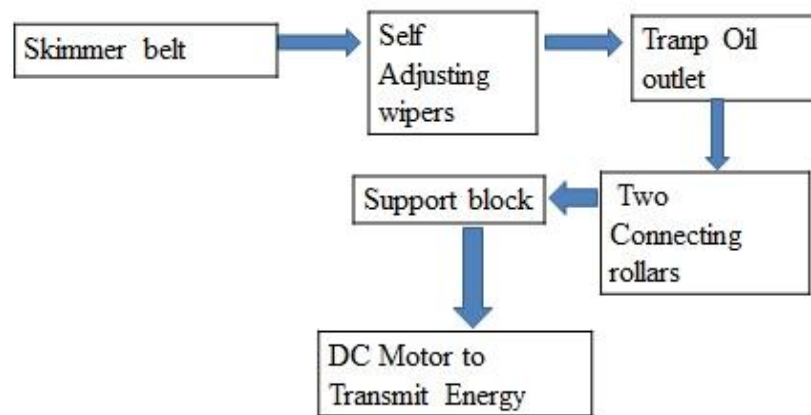
3. Suction skimmers , but in now using the belt of oil skimming must have the sufficient attraction or affinity for oil than the water. Besides, the durability must be optimistic. Belt is made from blends of fabrics made of two or more fibers mainly cotton and jute line with polyester or polymer filament. Sometime Jute Blanket is made from the cellulose-rich fiber of the jute plant, which is very common for sub-Indian continent especially in Bangladesh.

Abanaki, the world leader in oil skimmer products, manufactures a wide range of products to remove oils, greases, solvents, and related hydrocarbons from water.

### III.METHODOLOGY

For construction of economic blanket belt oil skimmer two major points is under consideration. First one is the construction of the frame and other relevant structure from locally found materials even from the scrap. That will minimize the cost greatly and low skilled workshop labour can fabricate the model effortlessly. Second is the cost of the belt which is tried to replace by blanket belt instead of conventional belt. The proposed belt oil skimmer utilizes a continuous belt with a wiper to remove oil. Instead of conventional costly polymer belt locally found belt which is used for warming purpose is applied. It is durable fabrics belt able to withstand rough handling during installation and maintenance.

### Methodology



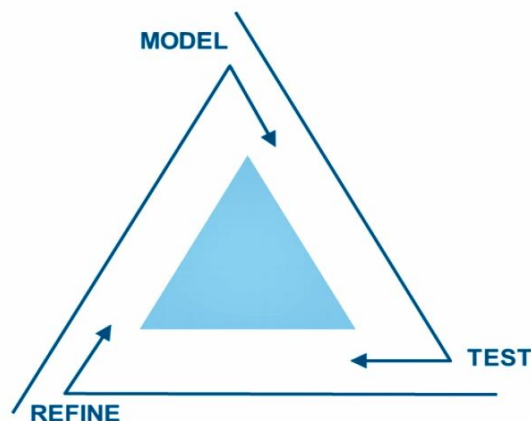
### Project purpose and objective

The purpose of the thesis is to study the oil skimming market and evaluate what drives company competitiveness and market attractiveness. Through this, Sandvik Process Systems can view their current and possible future position in the market and base their strategic direction on this.

The objective of the project is to map the strategic decisions Sandvik Process Systems is currently facing regarding the oil skimming business and their respective business implications.

### Creating an Analysis Model

From our insights into the market, we applied an iterative process of developing a suitable model for analysing the oil skimming market. By developing a model and briefly testing it, we could refine its components until a suitable model had been formulated.



**COMPONENTS LIST**

1. Rollers
2. Belt
3. Square tubes for frame set up
4. Bearings
5. Collecting tray
6. Oil skimmer blade
7. Shafts (12mm)
8. DC wiper motor (12v)
9. AC to DC power supply (230v)



### **Specifications**

- Belt type = fabric and fiber belt (130mm width and their length 4 feet)
- Frame for support block.
- Big Roller = (160mm length and 60mm diameter)
- Smaller Roller = (160mm length and 50mm diameter)
- Wiper Motor = 12 volts
- Power supply = 230v AC to 12v DC
- DC motor speed = 30 rpm
- Depth of belt to floating oil = 1 feet or 25cm

### **Advantages**

- A single unit elevates and separates oil.
- Lifts oil any distance without the need of expensive pumps.
- Maintains oil skimming efficiency with fluctuating fluid level.
- Requires no tank modifications in most applications.
- Easy mounting and fast cleaning, with minimal maintenance.

### **Disadvantages**

- It cannot allowed all the oil formats.
- It consider minimum large space required.
- And then only used high range viscosity of lubricating oils.

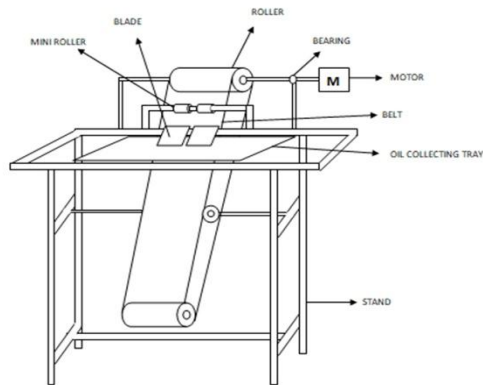
## **IV. FEATURES AND BENEFITS**

- Used for removing un-emulsified oil.
- Continuous cleaning operation. Auto belt tensioning.
- Ease of maintenance. Single drive. Very compact.
- Very low operating cost.
- No maintenance cost. Auto belt tensioning.
- Suitable for any liquid (excluding chemicals).
- Runs on only one drive. Requires lesser power.
- Very smooth & silent operation. Occupies less space.

## **V. OIL SKIMMING APPLICATIONS**

Oil skimming is a wide field and there exists many application of oil skimming equipment. However, in this thesis the market for oil skimming equipment has been divided into three subgroups; (1) Offshore Skimming, (2) Industrial Skimming, (3) Innovative Skimming

### VI. Layout of belt oil skimmer and fabrication model



### VIII. RESULTS

#### OIL USED : BIKE ENGINE OIL

Table: 1

Sl.NO	Belt speed rpm	Oil spilled ml	Collection of spilled oil ml	Time to collect oil min	Recovery rate ml/min
1	30	400	360	3.14	111.3
2	30	500	450	4.10	109.2
3	30	600	530	4.52	108.9
4	30	700	680	5.08	132.4

- The average experimental recovery rate of bike engine oil is **115.45 ml/min**.

Table: 2

Belt speed rpm	Thickness of the oil film	Recovery rate ml/min
30	1	153.9

- Theoretical recovery rate of bike engine oil is **153.9 ml/min**.

The recovery efficiency of the bike engine oil is **75%**.

Table: 3

Type of oil	Viscosity in centipoise (Before separation)	Viscosity in centipoise (After separation)	Efficiency in %
Bike engine oil	161.1	112.8	70.1
Garage oil	50.6	33.5	66.2
Mixed oil	141.3	97.4	68.9

Hence the viscosity efficiency of oil recovered using belt type oil skimmer is 70%. So the oil is reused for other purpose after separation.

## **IX.CONCLUSION**

The characteristics of the oil skimming business paired with Sandvik's current position on the market leads to the conclusion that there is an unappealing revenue potential-to-risk ratio surrounding this business. The technology of the product is in many ways inferior compared to competition. Nevertheless, the technology is suitable for oil skimming and works very well in some applications. However, the accumulated business stemming from these applications is not large enough to be of great interest. From another strategic standpoint, acquiring a competitor or a competing technology might make sense in theory, but contemplating the operational perspective, it would lead to the company diverging from its core business. The know how and expertise must be built up within the organisation and thus represents another risk factor to account for.

A general conclusion is that if the skimming business is to generate value for Sandvik, the company must either commit fully with intention of becoming market leader or simply abandon this market and pursue other, more lucrative business ventures.

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