



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 12, Issue 4, April 2023

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

ijirset@gmail.com

www.ijirset.com

Modification in Design of Oil Skimmer to Control Speed Mechanism

Darshit Sangani ¹, Tejas Savaliya ², Sahil Jiyani ³, Nishit Bhimani ⁴, Mayank Parmar ⁵,
Divyesh Jariwala ⁶, Rakesh Patel ⁷

Student, Department of Mechanical Engineering, Tapi Diploma Engineering, Gujarat, India¹

Student, Department of Mechanical Engineering, Tapi Diploma Engineering, Gujarat, India²

Student, Department of Mechanical Engineering, Tapi Diploma Engineering, Gujarat, India³

Student, Department of Mechanical Engineering, Tapi Diploma Engineering, Gujarat, India⁴

Student, Department of Mechanical Engineering, Tapi Diploma Engineering, Gujarat, India⁵

Guide, Department of Mechanical Engineering, Tapi Diploma Engineering, Gujarat, India⁶

Guide, Department of Mechanical Engineering, Tapi Diploma Engineering, Gujarat, India⁷

ABSTRACT: World has witnessed big oil spillage accidents into ocean and made huge impact to the environment. Apart this, sometimes Oil is getting spillage through being the results of chronic and careless habits in the use of oil industries and oil products. Off shore drilling & production operations and spills or leaks from ships or tankers are typically contributing less than 8% of the total whereas routine maintenance of ships (nearly 20%), onshore air pollution & hydrocarbon particles (about 13%) and natural seepage from the sea floor (over 8%). This has caused ever lasting damage to aquatic life. To separate the mixed oil from the water, industries wide various type of oil skimmers is getting used. Herewith, the objective of this project is to design and conduct efficiency studies of belt type oil skimmer by using various material belts. The belts absorb the oil from water which can be scooped out and collect into a vessel by providing piping arrangements.

KEYWORDS: Oil skimmer, Casing, Scraper plate, Belt, Pulley.

I. INTRODUCTION

Pollution is the most significant danger which threatens the human nature. The most dangerous of these pollutants is oil pollution, because oil pollution threatens the environment as well as economy. It has been studied that recently with increasing use of oil. According to Environmental Protection Agency, almost 14000 oil spills are reported each year in the oceans alone. Many countries have made stringent safety norms for waste water disposal content 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.

An oil skimmer is the device that is designed to remove oil floating on a liquid surface. Based on the specific design they are used for a various applications such as oil spill response, as a part of oily water treatment systems, removing oil from the coolant and aqueous part washers and collecting fats, mixed oil and grease oil in waste water treatment plant.

A large efficiency of oil recovery from physical method was shown although it was only suitable for application before oil emulsified. Meanwhile, chemical method might be concordant with all oil types but the chemical residual caused perniciously to marine environment

II. LITERATURE SURVEY

1. PHYSICAL CHARACTERISTICS

The oil physical properties such as surface tension, density, pour point, solubility in water and viscosity dramatically effected on the spreading speed of oil or oil slick . Density of most oils, that was an important factor in order to predict, determine the behavior in water,was lower and smaller than that of water so the oils floated and lied flat on water surface and tented to spread, expand horizontally. Lower density of oils resulted in increasing the evaporation of lighter materials and substances and they have left the heavier materials, which sank in water column, interacted with water or others in seawater to form the dangerous sedimentation on seawater body.

Oil viscosity was also an index of evaluating the rate of oil spreading. The information about the chocolate mousse was formed due to higher viscous oil and leads to the difficulty in degradation or treatment. Oil pour point was considered as a function of temperature, the oil spill becoming a semi-solid at temperature higher than that of freeze point caused the cleanup strategy difficultly and complicatedly. Solubility of oil in water related to form the pollutant and bioremediation was low and depends on temperature and chemical structure of hydrocarbon, solubility of oil in water was about 28-31 mg/l . On the other hand, oil surface tension was inversely proportional to temperature, hence oil spread more easily in warmer waters, this index effected directly, quickly on the ability of spreading even in case of disappearing the wind or water currents.

2. CHEMICAL CHARACTERISTICS

The hydrocarbons with 50% to 98% of oil total components dominated complex chemical properties of oil. Furthermore, oil also included non- hydrocarbon compounds such as oxygen, nitrogen, sulphur and trace metals. Hydrocarbons listed in oil components and classified following nomenclature by The International Union of Pure and Applied Chemistry (IUPAC) Oils might be divided into saturated and unsaturated hydrocarbons, aromatic hydrocarbons, resins and asphaltenes, refined products.

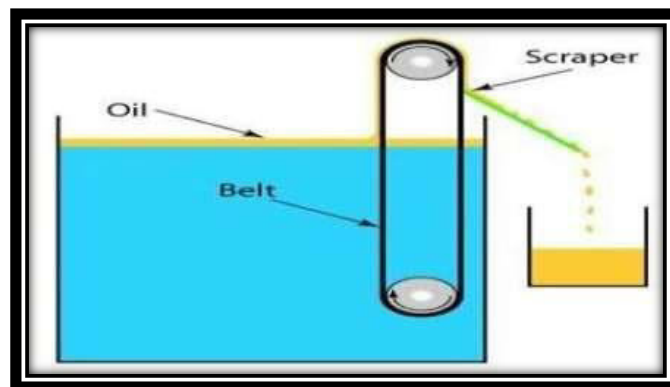


Fig 1.1 Working Of Oil Skimmer

WORKING

CNC Oil Skimmer greatly reduces "smoking" caused by tramp oil. They can help to increase the coolant change intervals, reduce a hazardous environment for operators from unnecessary fumes, pungent and contaminated coolant.

ADVANTAGE

- Increase in tool life.
- Increase in coolant life.
- Better quality can be obtained.
- Increase in surface finish & accuracy

- Increase in production rate.
- Increase in coolant supply.
- Increase in the life of coolant pump.

DISADVANTAGE

- Oil skimmer can separate only adhesive oil fluid particles.
- It can separate the oil which can float on the coolant..

III. PROJECT WORK

DESIGN OF OIL SKIMMER

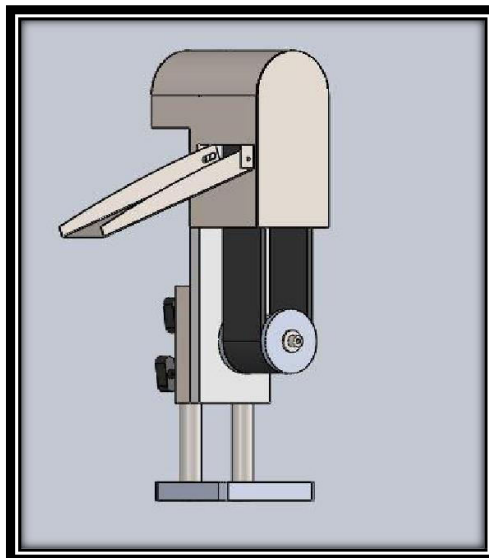


Fig 2.1 CNC OIL SKIMMER

DESIGN OF CASING

A Frame made from MS Plate 1mm Thickness. It is made from Laser Cutting, Welding can be done.



Fig 2.2 CASING



DESIGN OF SCRAPER PLATE

A Scraper Plate is made from MS Plate 1mm Thickness. It is made from Laser Cutting, Bending can be done.



Fig 2.3 SCARPER PLATE



Fig 2.4 FINAL PROJECT

Sr. No	Type of oil	Oil Viscosity (centi poise)		Efficiency
		Before Seperation	After Seperation	
1	Garage Oil	50.0	45.2	86%
2	SAE40	161.1	155.8	92%
3	Mixed Oil	114.3	103.3	88%

TABLE 1 ANALYSIS CHART



IV. CONCLUSION

As we learnt from all the research work that there are some important aspects and points that are essential to consider while designing an oil skimmer. The very first thing is the design aspects of the skimmer and rotational speed of the belt is very important and material which has been used. The slightest changes in the design aspect of the skimmer may cause a huge difference in the oil recovering efficiency of the skimmer. The belt must be of a polar material so that the oil that is a non-polar substance will stick to the surface of the belt. The other crucial thing is the placing of the component parts of the skimmer should be placed significantly. The working design of the skimmer should be accurate and significant for better performance of the skimmer. For the better efficiency it is studied that the polyurethane belt is most efficient for the skimmer to recover oil from the surface of the water. It is very crucial to keep the design aspects, the material of the component parts and the rotational speed of the belt to get effective oil recovery efficiency from the skimmer.

REFERENCES

- [1] Thombare Babasaheb B., Barse Babasaheb N., Barhate Ganesh B., Kolhe Sani M., & Jagtap Harshal B. (2018): "Analysis of belt type oil skimmer" IJARIE-ISSN(O)- 2395-4396 Vol-4 Issue-2 2018.
- [2] Rakesh Pund, Roshan Mhaske, Shivam Rahane & Shubham Rajput (2018): "Review on analysis of oil skimmer" International Research Journal of Engineering and Technology (IRJET) Volume: 05 Issue: 10 | Oct 2018.
- [3] Mamta Patel (2013): "Design and Efficiency Comparison of Various Belt Type Oil Skimmers" International Journal of Science and Research (IJSR) ISSN (Online): 2319- 7064.
- [4] Sathiyamoorthy V, Arumugam K, Arun Pragathish M, Barath B.N, Baskar M & Balamurugan S (2018): "A Review of Mobile Oil Skimmer", International Journal of Engineering & Technology 58-60
- [5] Rafi Jamal Algawai & Maha adnan Dawood (2014): "Study of operating conditions for oil skimmer apparatus from water" Research Gate Conference paper - 322303173, April 2017.
- [6] Arturo A. Keller & Kristin Clark (2008): "Oil recovery with novel skimmer surfaces under cold climate conditions" International Oil Spill Conference Proceedings: May 2008, Vol. 2008, No. 1, pp. 667-671.
- [7] Vishal G. Naphade, Atul M. Parande, Sunil N. Suryawanshi, Muqsid M. Inamdar & Vinayak Kale (2018): "Design of disc type oil separator", International Journal of Innovations in Engineering Research and Technology [IJERT], ISSN: 2394- 3696.



Impact Factor: 8.423



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details