

Study on –“The Stern Tube Oil Pollution in Ocean and Bio Composite Stern Tube Bearings Used To Reduce the Oil Spill Pollution”

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Abstract. This paper explains the oil lubricated bearings as a cause of the stern tube oil pollution in ocean. These articles give the idea of water lubricated composite material stern tube bearings to eliminate the oil pollution in the ocean. This paper gives an idea about bio composite material use for the water lubricated stern tube bearing. The new special methods are suggested for the manufacturing the bio composite from the wheat gluten polymer resin.

Keywords: Stern Tube oil pollution; water lubricated bearings; stern tube bearings; propeller shaft bearings; ship source pollution, bio composites, bio polymers.

1 Introduction

The contamination of the world's seas has expanded impressively from most recent couple of many years. The standard and worldwide guidelines are getting increasingly more severe for any sort of boat source contamination it should be zero resilience. On the off chance that the delivery organizations saw as blameworthy of contaminating US water nearly US \$140m in illegal penalties have been required by US Court in contradiction of them. The harsh cylinder oil will stream out into the ocean because of seal harmed by basic fishing net or rope got on ships turning shaft. There is demonstrated trend setting innovation which will keep away from the oil slick into seawater. The seawater is siphoned and utilized for the grease of the harsh cylinder. No oil is needed to grease up the harsh cylinder course. Gentle steel direction requires the insurance in contradiction of the consumption from the salt water. [3]

Presently day epoxy tar composite material are utilized for harsh cylinder course. Natural dishonorable bio leaves composite material utilized harsh cylinder heading a cutting edge innovation. The wheat gluten material is having very good thermal as well as combustion properties. [15] The gluten is extracted from the wheat with help of special method in the form of very fine powder. With the help of this powder the bio polymer resin is formed, it is explained further in the process. The stern tube bearings are made with the bio polymer resin. As that propeller shaft bearings are oil lubricated they reduce the oil spill pollution in the ocean.

2. Problem Statement-

2.1 Stern Tube Lubricating oil is an issue [1]

Presently, most of business maritime boats work with an impetus framework utilizing a propeller shaft regularly upheld by oil greased up white heading oil surrounded harsh cylinder by shaft seals. This fixed harsh cylinder framework is loaded up with mineral oil and fixed commonly with aonward rearward lip typesclosure at everyfinish. Commonplace harsh cylinder contains 1500L (396 US lady) of minerals oil. The white metals harsh cylinder manner in a fixed framework accommodates unsurprising and control attirelifetime of shaft heading. This framework has been being used since the 1950's the point at which it supplanted ocean water greased up lignum wood heading where wooden direction wear life was eccentric and erosion show was an issue. Anyway there are a few issues with oil greased up harsh cylinder bearing framework and the gave have develop significantly additional predominant nowadays with worry over any boat source contamination.

Subsequent is the pie graph presentation the sea contamination because of various reasons.

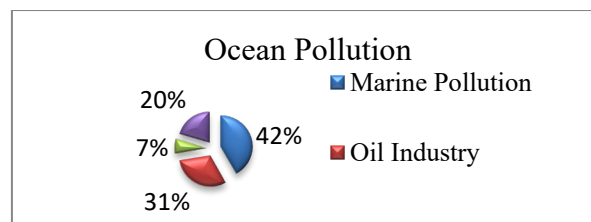


Fig 1: Ocean oil pollution [1]

2.2 Causes of Stern Tube oil pollution.

Oil contamination from seal harm is a major issue because of following reason.

- a) Expensive to fix seal
- b) Criminal fine or prison term for transport group, supervisor, and proprietor.
- c) Loss of agreements or licenses.
- d) Bad advertising or protection issues.
- e) There is demonstrated choice to keep away from the oil contamination.
- f) Sea water greased up composite material direction.
- g) Eliminate harsh cylinder oil and contamination hazard
- h) Viable choice to oil greased up white metal propeller shaft direction

2.3 Problems due to the metallic stern tube bearings.

Subsequent figure show the issues because of the metallic harsh cylinder heading. Figure no 2 show the totally harmed oil greased up slide course and fixing of boat propeller shaft.

In figure no 3 the consumed cantilever open attitude propeller shaft is appeared. In figure no 4 Impairment of a merged shrubbery, coming about because of edge push coming about because of slant position of shaft pivot (up); is appeared, during fix the harmed authority was pounded to stay away from breaks and de-cover of the composite (down)



Fig 2. Completely damaged oil-lubricated slide bearing and sealing of ship propeller shaft

[4]



Fig 3. Cantilever open bearing of yacht's propeller shaft [4]



Fig 4. Damage of a composite bush, resulting from edge thrust resulting from skew position of shaft axis (up); during repair the damaged edge was grinded to avoid cracks and de-lamination of the composite (down) [4]



Figure 5. Composite material seawater lubricated stern tube bearings –no oil required [1]

4 Bio Composites

Bio composites are the material made with one or additional phase materials resulting from organic origins. In this method the carbon fiber are reinforced with gluten polymer resin matrix. The matrix defend the reinforced fiber beside environmental changes and external impact. Existing composites are made by polymer materials matrix. But this matrix is non degradable generates some environmental concerns. To solve this conflict there is need to develop bio degradable materials. Present matrix materials are formed with the petroleum products and these petroleum products are going to deplete in upcoming days, due to this there is need to develop the some alternative bio polymer resins. [18]

The utilization of bio composite relies upon the properties of normal strands utilized in them. The utilization of characteristic strands in composites having a few hindrances like low modulus of flexibility, high dampness assimilation, disintegration in basic ecological fluctuation in mechanical and physical properties.[18] Due to these reasons the harsh cylinder direction are shaped with carbon filaments built up with wheat gluten polymer pitch.

5 Methods for the formation of Wheat gluten polymer bio resin -

Wheat gluten is the by-product of the starch formation plant from wheat. It is easily accessible in high amount and little price. Wheat gluten contain 2 main group of protein, which are gliadin and glutenin. [16] Gluten is fully biodegradable and non toxic. Wheat gluten is having good properties like visco-elasticity, film formation, foam formation, and bio degradability. Due to these properties wheat glutes are used in composite materials. During plastic making the wheat gluten is heated from 80°C to 170°C allowing the properties to make cross links which defines the properties of the materials. [19]

Wheat gluten polymer resin can be formed by following two methods.

1.1. By plasticizing-

The fine particles of wheat gluten are mixed with plasticizer. Mostly used plasticizer is the Glycerol or triethanolamine. The gluten and plasticizer is mixed in torque rheometer.. Temperature is adjusted to 80°C.

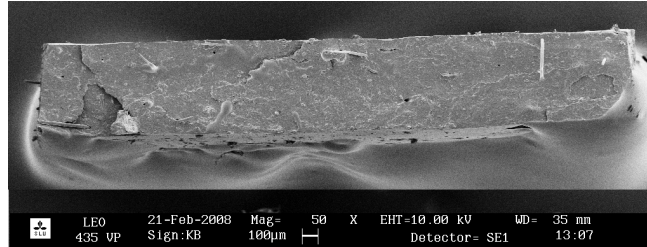


Figure 6. SEM image of a wheat gluten plastic fracture surface. Image courtesy of Kerstin Brismar, SLU Alnarp. [20]

Above figure no 7 shows the high content of hydrogen bonds in wheat gluten, it creates low oxygen permeability under dry condition, and it makes the gluten film brittle. Therefore it is important to use polar plasticizer to break the polypeptides bonds. It increases the toughness of the plastic film. Wheat gluten polymer materials can be manufactured by methods like, extrusion, compression molding and solution casting. [20]

1.2. By mixing with synthetic polymers-

The fine particles of wheat gluten are mixed with the commonly used synthetic polymers that are polypropylene, HDPE, PVC, PS, epoxies and polyesters. The synthetic polymers are used as binders in composites because they are cheaper than other alternatives. However, they are not eco friendly this disadvantage will give chance to the new researcher to think for the natural polymers. The new trend is arrived to replace the synthetic polymers with renewable and bio degradable wheat gluten polymer. [20]

6 Formation of Stern tube bearings

The resin is formed by above method is used to manufacture the stern tube bearings using hand layup or vacuum method. The dimensions of the bearings are decided by the requirement, where it is used.

7 Conclusion

The operational and coincidental harsh cylinder oil contamination while lessening transport proprietor upkeep expenses and setting aside cash over the assistance life of the boat is killed by the boat exchanging organizations the world. New composite Bearings have brought about seawater greased up harsh cylinder direction contribution better attire life, appropriate and checking techniques to meet Class Society endorsements which are the demonstrated bearing plan. The exhibition of seawater greased up composite heading to date has been similar to oil greased up white metal harsh cylinder course. Any danger of illegal, common and managerial punishments and other unfavorable responses, for example, terrible advertising for the boat proprietor that may happen oil spilling the harsh cylinder is killed by the composite manner method. [3]

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