

OIL SKIMMER SYSTEM

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ABSTRACT

Oil skimmers are pieces of equipment that remove oil floating on the surface of a fluid. These generally 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 the equipment. Oil skimmers are usually all that is necessary to remove oil from a liquid. In some cases, however, they may be used to pre-treat a fluid. In this case, they remove as much of the oil as possible before more expensive and time-consuming measures are employed. Pre-treating the fluid this way reduces the overall cost of cleaning the liquid. There are several different types of oil skimmers, though all designs depend on the laws of gravity and on surface tension in order to function. The six primary types are belt, disk, drum or barrel style, mop, large tube or mini tube, and floating suction oil skimmers. Belt oil skimmers utilize a belt of stainless steel. This belt is lowered into the liquid that needs to be cleaned. The belt then passes through special wiper blades, which remove the oil from both sides of the liquid as it passes through.

2. LITERATURE SURVEY

- · Per-O l of Persson, University Lecturer, Industrial Ecology, Royal Institute of Technology: As a lecturer on technical environmental protection, Mr Persson has come into contact with oil skimming on a number of occasions. Mr Persson's expertise also includes different types of oils and different oil treatment methods.
- · Örjan Nilsson, Application Technology – Purchase, Sandvik Process Systems: Mr Nilsson is responsible for the oil skimmer within Sandvik Process Systems and has conducted tests on the skimmer. Mr Nilsson also holds the information regarding current applications of the oil skimmer.
- · Tommy Carlsson & Lars Mattson, Rescue Coordinators, Regional Control Centre, Swedish Coast Guard: As rescue coordinators for the Swedish Coast Guard, Mr Carlsson and Mr Mattson have coordinated rescue operations to combat oil spills. They have also been active in the process of purchasing

new equipment to combat oil spills and thereby hold a strong expertise in which technical solutions are available.

- Jonas Johnson, CEO, Surf Cleaner: As the CEO of a company producing oil skimming equipment, Mr Johnson has insight into the oil skimming market's dynamics and development. As Surf Cleaner offers an innovative product, Mr Johnson's expertise also includes new technology on the oil skimming markets and its applications.

1. TITLE-1

An oil skimmer is a machine that separates a liquid from particles floating on it or from another liquid. A common application is removing oil floating on water. These technologies are commonly used for oil spill remediation but are also commonly found in industrial applications such as removing oil from machine tool coolant and removing oil from aqueous parts washers. They were used to great effect to assist in the remediation of the exxon_valdez spill. Oil skimmers are commonly found in three types: weir and oleophilic and non-oleophilic (disc, drum, belt, tube, brush, mop, grooved disc, grooved drum)

1.1 SUB TITLE-

Weir skimmers function by allowing the oil floating on the surface of the water to flow over a weir. The height of the weir may be adjustable. These devices will collect water when oil is no longer present. Weir skimmers are also available in floating, self-adjusting variations. These models allow them to be effectively used even in changing water levels.

2. TITLE-2

CONSTRUCTION & WORKING

The oil skimmer consists of a basic mechanism that produces a rotating movement from continuously rotary input. It mainly consists of an electric motor whose output shaft is directly coupled to the disc which is made up of acrylic material. The oil and water mixture is filled into the steel container and the oil skimmer assembly is kept into the tank. As when the acrylic disc rotates it creates the adhesion force between oil and disk surface so that the oil will stick to the disk and finally oil will be removed from the disk with the help of a scrubber and it is collected in another tank.

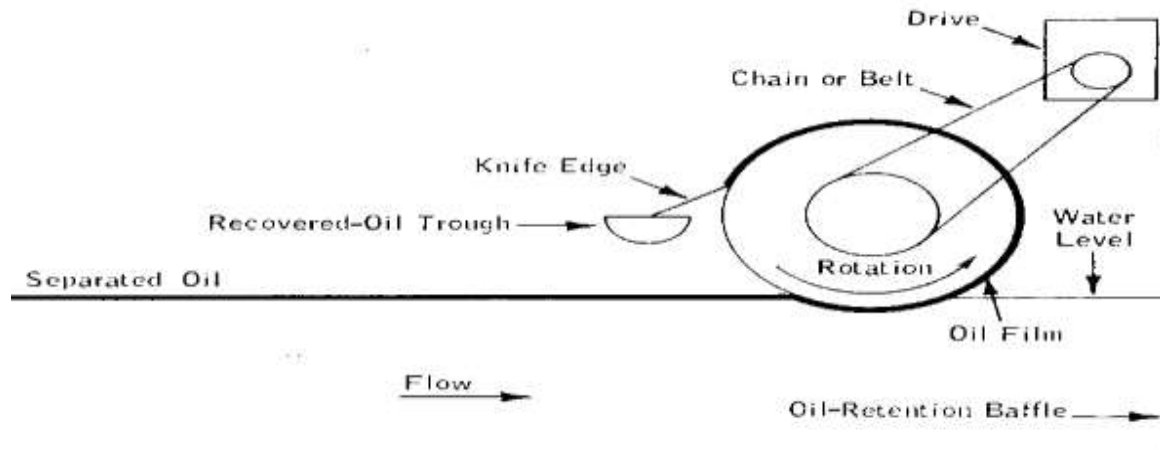


Fig: Concept Method Of Oil Skimmer

2.1 Sub Title

1.Motor

The motor is a single phase AC commutator motor, 166 watt power meaning that the speed is infinitely variable from 20 rpm. The motor is mounted on the base plate and is connected to the input shaft by means of a V-belt.

2.Acrylic Disk

Acrylic fibers are synthetic fibers made from a polymer (polyacrylonitrile) with an average molecular weight of ~100,000, about 1900 monomer units. For a fiber to be called "acrylic" in the US, the polymer must contain at least 85% acrylonitrile monomer. Typical comonomers are vinyl acetate or methyl acrylate. DuPont created the first acrylic fibers in 1941 and trademarked them under the name Orlon. It was first developed in the mid-1940s but was not produced in large quantities until the 1950s. Strong and warm, acrylic fiber is often used for sweaters and tracksuits and as linings for boots and gloves, as well as in furnishing fabrics and carpets. It is manufactured as a filament, then cut into short staple lengths similar to wool hairs, and spun into yarn.

3. Base plate

The base plate is the base member that connects shaft of motor and the acrylic disk.

4. Steel Container

Steel is an alloy of iron and other elements, primarily carbon, that is widely used in construction and other applications because of its high tensile strength and low cost. The main Function of steel container is to fill the oil water mixture.

3. TITLE-3 METHODOLOGY

The disc oil skimmer removes surface waste oils and other hydrocarbons floating on the parts washer cleaning solution surface. Removing waste oil lengthens the solution bath life and prevents re-deposition on clean parts. Collected oil is disposed of easily at lower cost and potentially is a revenue source.

The skimmer works on the physics principle of the difference in surface tension of oil and water allowing the rotating disk to attract waste oil and reject water. Imagine dipping your finger in a glass of water with oil floating on the surface and then removing it. Your finger is coated with oil. The same principles apply with the rotating disk. Wiper blades scrape the disk surface in a continuous operation. Highly efficient, the 12 inch (300mm) skimmer will remove up to 3 gallons per hour (GPH) (11 l/hr) and the 18 inch (450mm) skimmer up to 6 GPH (22 l/hr).

4. Application

- It is used in different fields :
 - Marine applications
 - Manufacturing industries
 - Food processing plant
 - Steel mills
 - Garage
 - Oil refineries
 - Chemical plants.

5. Conclusion

- If the speed of the disk is high, then the adhesion property between the disk surface and oil is less so that, less amount of oil is separated from the water.
- This oil skimmer cannot separate the oil which is having different viscosity.
- The efficiency of the oil skimmer is increased if the more than one disk is mounted in series or on same shaft.

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