The Challenge Of Removing Free-Floating Oil

Imagine tackling your greatest production challenge quickly, easily and inexpensively — and even generating a profit while doing so. For businesses and industries that deal with oil separation and removal, the solution does not need to be expensive or inefficient. In fact, the answer may be simpler than you think.

When Oil is a Problem

Industries as diverse as steel, biodiesel, manufacturing, food processing, trucking service industries, wastewater treatment and utility – all face a simple, common problem: oily water.

Where water is used extensively at some point along the production process, either in cooling machinery, washing down equipment or playing a crucial part in the manufacturing process, problems occur when water picks up oil. Regardless of whether the facility reuses the water or sends it to a city treatment plant, it has to be removed.

Many facilities, however, are not equipped to effectively remove oil. Plant efficiency suffers.

Even worse, profitability suffers.

Traditional Approaches to Oil/Water Separation

The first step in removing oil is separating it from water.

Stokes' Law states that, given time and a large enough surface area, oil and water will eventually separate, giving you two distinctive layers. A good system of separation will give you those two layers.

To facilitate this process of separation, many plants use built-in grease/oil water interceptors, or separators. By using a combination of flow patterns, baffles, plates or aeration to increase contact with the oily water, these speed up the process by maximizing the number of small droplets that will agglomerate and rise to the surface, resulting in a concentrated oil layer and a layer of oil-free water ready for secondary processing or discharge.

While separators themselves are efficient and inexpensive to use, there is still the problem of removing the separated oil.

When oil is not continuously removed from the surface of the oil/water separator, several problems can occur:

- Heavy rain or water flow can exceed the design of the separator and wash out the oil build-up;
- Failure to remove the oil can cause excessive oil build-up, increasing the chance for the oil to escape and reduce the area of the separation chamber;
- The oil layer prevents oxygen from reaching the water, allowing anaerobic bacteria to grow, plugging separator plates and emitting foul odors;
- During maintenance, or as components are lifted out, the tank walls and interior components become completely oil-coated;
- When completely drained, residual oil escapes into the outlet piping and released downstream once the separator is refilled; and/or
- The oil layer can make visual inspections of the coalescer and components very difficult, if not impossible.

Most oil removal solutions and services are effective in removing the oil, but they can be expensive, with some requiring additional manpower or expensive parts that require continuous maintenance.

Traditional Methods of Oil Removal

Absorbent Pads

Available in different shapes, sizes and materials, pads are used to absorb excess oils and greases that can result from accidents or spills during routine machinery operation. Effective for preventing the spread of source leaks and efficient in terms of pickup, pads are useful for removing small amounts of oil.

Using them on large volumes of waste oil, however, makes them impractical for daily usage due to costs involved with their purchase, disposal and deployment. In addition, only a small amount of oil can be squeezed out of the pad for recycling, while the remaining oil must be disposed of in a landfill, or burned.

Vacuum Trucks

At first glance, vacuum trucks are the ideal solution for oil removal, as the oily layer from wastewater is simply vacuumed up and shipped off to recycling or disposal points.

For large oil spills, vacuum trucks are ideal as they will quickly pick up large amounts of oil. And, when waste oil is thoroughly separated, highly concentrated and stored in appropriate receptacles, then this method is also quite efficient.

However, vacuum trucks can become expensive, depending on the frequency of their use. If used more than once a quarter, costs begin to rise. Even more, due to the nature of the process, large amounts of water are also taken with the oil, resulting in higher volume costs.

Finally, when the oil is removed infrequently, it begins to build up again on the surface, leading to problems including the potential for bacteria growth.

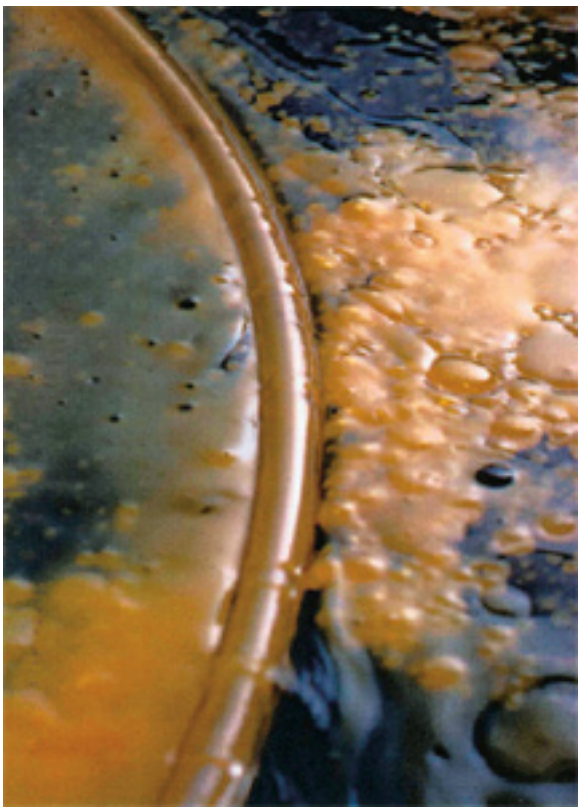
Manually Operated “Slotted Pipes”

A great many plants have an oil separator consisting of a large tank or basin containing a series of baffles and weirs over which oil and water pass.

With a “slotted pipe” system, the oil is removed using a pipe with a horizontal opening located near the top of the container. An operator removes the oil by turning the horizontal opening downward until it meets the floating oil layer. The oil then flows through the pipe to a collection receptacle.

While these pipes work well on thick layers of oil, they have the same drawback as vacuum trucks: They remove large amounts of water.

When the oil and water mixture overflows, it is difficult for the slot skimmer to remove only the oil. A large percentage of water enters the pipe, requiring a second oil separation and possibly a third or fourth try, increasing its expense.



Overflow Weir

A large percentage of oil separation devices currently in use today are some variation of the overflow weir, where oil is floated over a lip into a trough or pipe. However, like vacuums and slotted pipes, the problem is taking on water and other fluids along with the oil.

An operator is responsible for avoiding excessive loss of water or coolant, avoid overflowing the skimmed oil storage tank, prevent the lip from being blocked by floating debris, and to perform any secondary decanting operations necessary to eliminate excess water in the oil for disposal or to avoid loss of coolant. Neglect of duty by an operator can result in gross escapes of tramp oil.

Because overflow weirs require constant supervision, they are not an efficient separation method. The operator must carefully calibrate the weir at all times; too low, then you run the risk of taking on too much water. Too high, and the weir will fail to remove the oil.

Troughs are also difficult to adequately separate the oil. The surface to be skimmed is usually down in a hole so the skimmed material must be pumped out. Because the oil is usually sticky and loaded with grit and debris, pumping it is costly. Adding to costs, the tank must be drained and dug out periodically.

Oil Skimmers

With so many variables at play, it makes sense to choose a solution that is simple, dependable, easy to use and is extremely cost effective: oil skimmers. Which to choose? Oil skimmers come in a variety of types, including tube skimmers, drum

skimmers, belt skimmers and disk skimmers, all designed with one idea in mind: Oil sticks to a surface; the skimmer scrapes it off.

But not all skimmer types are created equal.

Drum and Disc Type Skimmers

Drum and disc type skimmers are fairly simple in execution: The lower edge of a revolving drum or a disc submerges and collects oil on the surface, carried up to a scraper, where the oil is then scraped off into a trough or tank.

Unfortunately, the drawbacks to using this type of skimmer are many. First, with both of these types the disc or drum must contact the surface. This means that either the water level must be rigidly controlled or the whole machine put on a raft. In addition, floating the machine often interferes with the other equipment in the reservoir and runs the risk of sinking due to solids building up, or an accident.

Finally, these machines cannot elevate the skimmed oil very high so pumping is often necessary. The heavy, gritty oil skimmed sometimes requires the addition of water so that it can be pumped, requiring secondary decanting.

Belt Skimmers

Belt type skimmers look like belt conveyors standing on end with the idler pulley under water and the drive pulley above the skimmed oil storage tank. Floating oil clings to the belt surface and is conveyed to a scraper, where the oil is scraped off into a trough and flows to the storage tank.

However, in order to compensate for level fluctuation, belts are used to reach the low levels. When the liquid level is above this low level, the bottom of the belt hangs down into the solution. Thus the oil that had previously settled on the surface is now picked up and carried into the liquid, defeating the entire skimming process and exacerbating typical oil in water problems: clogged lines and filters, less efficient cleaning, etc.

Belt skimmers also only offer a small strip to the surface to which the oil can adhere. In addition, belt skimmers create no movement to draw the oil.

The support or bridging needed to mount belt skimmers can often exceed the cost of the unit. Further, belt skimmers require a bottom pulley to keep tension on the belt, trapping debris and oil and throwing the skimmer off track.

Oil and debris can also create problems with a belt skimmer’s drive mechanism and wiper blades, requiring constant adjustment and/or corrective maintenance.

Tube Skimmers

Tube skimmers are designed to ensure consistent, even operation, regardless of the application. And when it comes to performance, tube skimmers consistently

outperform any other types of skimmers.

Tube skimmers run on a simple concept: continuously remove oil from the surface of the water using a closed-loop tube that attracts the floating oil or grease.

Oil adheres to the outside of the closed looped tube, which is continuously driven across the separator's surface and through a set of scrapers that remove the oil, which is then drained into a collection tank.

Tube skimmers can efficiently remove all petroleum-based oil, fats, greases and oily wastes as well as animal and vegetable oils that float on the surface of water. And unlike other skimmers, which can get clogged by floating debris, tube skimmers have the ability to snake over, under and through debris to constantly pick up oil.

Tube skimmers are a practical solution, with benefits that include:

Availability in a variety of configurations. Skimmers are capable of removing oils, great and floating sludge from a variety of containment systems, including in-plan open or closed tanks and vats.

Flexibility and versatility. When equipped with a balanced boom system Tube Skimmers can extend as far as 16 feet and, can move around as desired for maximum portability, eliminating the need for expensive bridging or foundations. In addition, the free floating collector tube floats up and down with the liquid level, keeping the machinery up and out of danger.

Easy to install. Tube Skimmers are operationally efficient. Tube skimmers provide pre-fabricated mounting systems that provide easy, economical installation.

Low maintenance. Due to simplicity of design, tube skimmers are not susceptible to clogging and parts maintenance problems of other types of systems.

Less costly to use. Tube Skimmers can be unattended and left to run 24 hours a day, seven days a week. No operators or additional manpower is required to attend to a tube skimmer.

Oil Skimmers Inc. manufactures a variety of oil skimmers. Visit www.oilskim.com *[1] for more information.*

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[1] http://www.oilskim.com/