Innovative "green" biofilter for oily bilgewater treatment

Jason A. Caplan, PhD, President & CEO, EnSolve Biosystems, Inc. (www.ensolve.com)

Bilge water consists of liquids that drain to the lower regions of the ship's hull and is comprised of water, oils, fuels, surfactants, and a myriad of other contaminants. Common methods of separating and removing oil from this mixture include coalescing, filtration, centrifugation, flocculation, and/or combinations of these technologies. There are varying degrees of success of each of these methods but a common problem for all of these oil water separators (OWS) is the high cost involved for long-term operation and maintenance. This may not be reflected in the initial price tag but ship engineers are well aware of the high labour and materials costs to maintain these systems. When such operational costs are factored in, the total cost of ownership (TCO) of these OWS systems can be astronomical, in some cases up to $100,000 per year per vessel. In contrast, the operational costs associated with EnSolve's PetroLiminator® OWS system are a fraction of those of conventional OWS systems.

Since its initial introduction to the maritime market in 2000, the PetroLiminator OWS system has been installed on a wide variety of ship platforms including cruise ships, ferries, Ro-Ro's, military vessels, off-shore drill rigs, work boats, supply vessels, ore carries, and many others. None of our PetroLiminator clients has been cited by the regulatory authorities for an illegal discharge of oily bilgewater.

The PetroLiminator OWS from EnSolve Biosystems, Inc.

Superior OWS technology

EnSolve's novel PetroLiminator OWS consists of three stages: Stage I physically separates and removes the non-emulsified oil via an advanced coalescing matrix. The influent stream enters the inlet chamber where water turbulence and velocity are sharply reduced, and initial gravimetric separation occurs. As the bilgewater flows through the separation chamber, oil droplets coalesce and grow in size rising to the surface for removal.

From Stage I, the process flow is directed into the Stage II biotreatment chamber for further treatment. In this chamber the environment is controlled for optimal growth of hydrocarbon-degrading microbes. Stage II is packed with support matrix media with billions of hydrocarbon-degrading microbes attached to its surface. These are natural, non-pathogenic microorganisms that have been selected to consume oil as its primary carbon source. The process of bioremediation has been used for decades to treat thousands of waste streams and contaminated ground water sites worldwide. EnSolve Biosystems has adapted and patented a process that utilizes this technology for shipboard specific use. In biodegradation, petroleum hydrocarbons are converted to CO_2, cell components, and water. Optimal biodegradation of hydrocarbons will occur with the pH between six and eight, temperature between 10 and 35 °C, abundant oxygen, and safe nutrients for sustained growth.

Stage III is a final clarifier, which allows for continuous oil concentration analysis and removal of hydrocarbon-free effluent. The oil content monitor ensures that only effluent meeting the preset criteria (i.e., oil concentration) will be discharged over board.

From an operational standpoint, the elegance is built into the design, not operation of the PetroLiminator OWS system. Unlike many OWS systems that require a lot of attention, the PetroLiminator system is fully automated. The operator merely has to turn the dial to "Automatic Operation" and walk away. A one-page laminated quick reference guide is chained to the system which provides the recommended daily (five minutes) and weekly (15 minutes) system checks. No flocculation agents or carbon adsorbent filters are required. Unlike centrifugation OWS systems, no pre-treatment weir tanks are required for the PetroLiminator OWS thus saving ship owners valuable space and costs for such installations.

Certifications

There are three PetroLiminator models available for any size ship. Each model is USCG, MEPC 107(49), and Transport Canada Approved. The PetroLiminator is also ABS and DNV Type Approved and MED certified so the PetroLiminator OWS system is available to operate world-wide.

Total cost of ownership

EnSolve Biosystems has benchmarked the total cost of ownership (TCO) of the PetroLiminator OWS against other OWS systems. The operating costs, manpower requirements, wastes generated, and capital costs of different systems were collected over the past 10 years. The median cost data below confirms that the PetroLiminator's TCO is two to six times lower than conventional OWS systems.

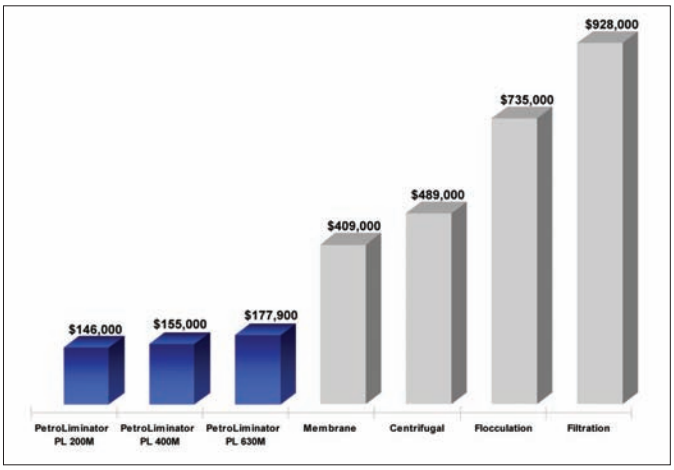

Figure 1: Ten-year Total Cost of Ownership (TCO) comparison of various bilgewater treatment systems. Not shown in the graph above is the waste generated from each OWS system. The PetroLiminator OWS system generates up to 14 times less waste than other OWS systems.

Conclusion

The PetroLiminator OWS provides ship operators and owners a reliable, "green", and economical solution for treating bilgewater on board any vessel. Compared to other OWS systems on the market, the PetroLiminator OWS is simple to operate and does not require carbon filters, flocculants, or similar disposable materials that only transfer oil from one phase to another and are prohibitively expensive to dispose. Those already using PetroLiminator OWS include some of the largest shipping companies in the world with ships operating in some of the most extreme environments. For more than a dozen years, the PetroLiminator has proved durable and resilient in the most extreme marine environments. *For more information, see the EnSolve Biosystems website at www.ensolve.com .*