APPLICATION OF 'OILSEP ECOLOGY' SYSTEM FOR OIL RECOVERY IN PALM OIL MILLS

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During the past three decades, Malaysia witnessed a 23% increase in its processing facilities from 352 mills in 1984 to 432 mills in 2014 to produce crude palm oil (CPO) and palm kernel (PK). But the rapid expansion of the Indonesian palm oil production seem to trigger an unhealthy supply and demand relationship in the global oil market for palm oil. Now, with the descending prices of palm products coupled with the rising cost of production, this has thrown the spotlight on the processing operation to ensure that the process losses are well under control. Palm-based products, being mechanically extracted, can operate in a wide range of milling efficiencies. Losses in certain areas of processing can easily escape detection as mills do not conduct certain time processing tests like oil losses in empty fruit bunches (EFB). In addition, some oil losses involving oil particles below 15 microns cannot be separated in a clarifier or separator and find its way into the effluent stream. The industry appears to be keen to reduce the existing oil losses so that the mill extraction efficiency can be improved. There are few technologies being tried in different areas in the processing line. This technology recovers the oil that is otherwise lost in the effluent and will eventually result in an increase of the mill oil extraction rate (OER).

OBJECTIVE

'Oilsep Ecology' system is a promising technology for palm oil millers to address the oil recovery as well as reduction in BOD load to the palm oil mill effluent (POME) treatment system.

TECHNOLOGY

'Oilsep' is a system designed and produced to accelerate the natural physical process of separation of two liquids and it is based on a purely physical principle. The machine exploits the different density and viscosity of the immiscible fluids and their different flow velocities as they pass through the elements inside the tank; this leads to their separation and re-aggregation on the basis of their density. This enables all liquids, whatever their density, to be recovered in a single step, even those with low density and viscosity (*e.g.* petroleum, gasoline, diesel and naphtha), which cannot be recovered using other systems. The system requires no centrifuges, coalescence devices, chemical additives, or scraper discs which require frequent regular maintenance and cause subsequent disposal problems.

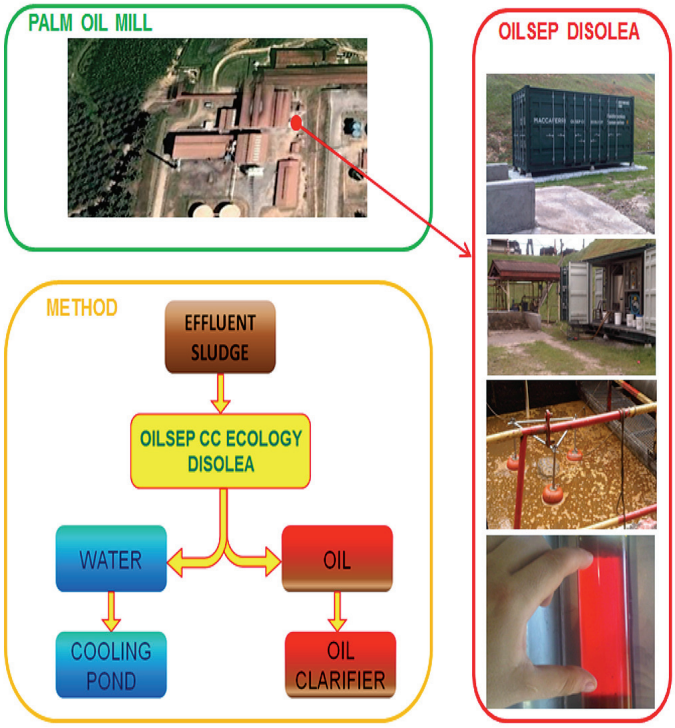

Figure 1. 'Oilsep'/Disolea flow chart.

'Oilsep' is easy to install nearby the sludge pit and requires only electrical connection and water pipe connection.

The effluent is pumped through a skimmer into the system by means of a peristaltic pump which uses a rotor connected to two rollers. As these rotate, the effluent is squeezed inside the rubber hose and pushed along inside the separation and re-combination tank. Here, the two liquids are separated and the oil is recovered.

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Figure 2. 'Oilsep' installed nearby the sludge pit.

PERFORMANCE

The high amount of oil recovered from the sludge pit of palm oil mill by 'Oilsep' is a basis for expecting similar optimistic performance in any sludge pit, even where the free oil content in the pit is much higher. 'Oilsep' has the flexibility to adapt and limit peaks of oil concentration, acting as a back-up system, when quantities of oil, higher than usual, are discharged together with the effluent in the sludge pit.

efficiency and enhancing relations with market, regulatory agencies, general public and consumers. 'Oilsep' Disolea, installed at the sludge pit of the palm oil mill, can considerably contribute to separate the oil from the effluent, increasing the OER and reducing the oil content in the palm oil mill effluent. When 'Oilsep' operation is automated and installed to treat the oil mixed liquor directly downstream of the clarifier, its benefits can be much greater.

ECONOMIC EVALUATION

'Oilsep' uses simple technology to operate; it can be directly controlled and adjusted to separate oil and water by mill operators. It requires limited ordinary maintenance and low operating costs. While 'Oilsep' provides clear environmental benefits by reducing the concentration of BOD, COD, oil and grease in the effluent, its ability to recover oil from effluent makes it useful and suitable to be installed in palm oil mills. With a total of 280 000 t FFB processed per year for a typical 45 t hr^{-1} palm oil mill, at an average crude palm oil price of RM 2500 t^{-1}, the oil recovered with 'Oilsep' may bring an additional revenue of RM 0.8 million a year.

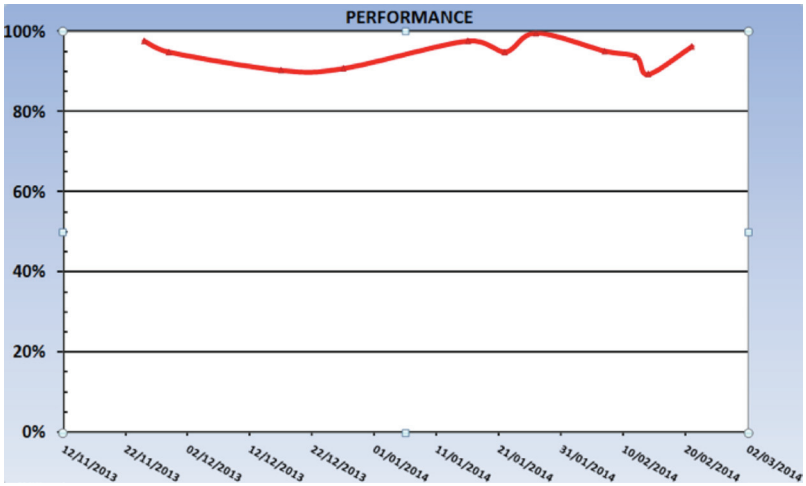

Figure 3. 'Oilsep' performance varies from 88% to 99%.

Nevertheless, the quality of the separated oil is also significantly good. FFA and DOBI results show the oil characteristics are such that the oil can be recyled to the oil clarifier and purifier. The efficiency of 'Oilsep' in recovering oil has been found to be higher than 90%, even if the concentration of oil in the effluent discharged in the sludge pit was lower than 1%.

BENEFITS

To promote and adopt good environmental practices in daily operations at the sludge pit, and to let the millers gain significant benefits such as increasing cost savings, improving the operational

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