BioREM Submersible Mixer for POME Anaerobic Pond

INTRODUCTION

The primary function of anaerobic pond in the POME treatment is to provide anaerobic-type biological digestion of both soluble and insoluble organic compound contained within the influent from POM factory. It is also the most important unit processes within the POME treatment, as 80% organic contamination (or simplified as BOD) is being decomposed. During this unit process, the anaerobic range of bacteria is expected to convert the BOD into methane gas predominantly and other form of organic acetates.

Therefore it is critically important to ensure an optimal operation of anaerobic pond, for if it fails, all the downstream unit process will be impacted adversely.

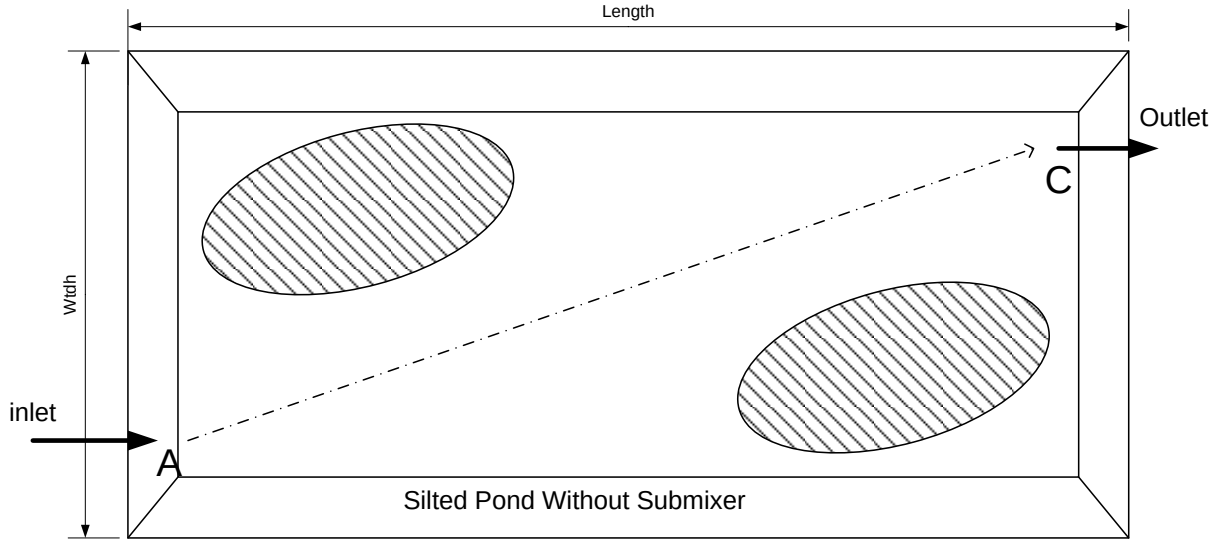
The anaerobic lagoon process is relatively very forgiving, as normally very high design allowance is been provided. For instance, the normal design retention time is 60 days; in comparison to a tank bio-digestor design, 10-16 days of retention is generally being taken. The advantage of an anaerobic lagoon is closely attributed to its high hydraulic retention time (HRT).

Therefore it is paramount to maintain the design 'effective' retention time of lagoon if it is expected to perform.

Design Hydraulic Retention Time Vs Effective Hydraulic Retention Time

It is worthy of us to differentiate the 'design' and 'effective' retention time of lagoon. To elaborate, the 'design' or 'physical' retention time is computed by dividing the 'design' volumetric capacity of pond with the flow-rate of influent/effluent. The 'effective' retention time is the actual time taken for a single droplet of water to flow from *inlet of lagoon* to *outlet of lagoon.*

The difference between the two numbers could be as high as 70% if the lagoon is silted and short-circuited. This is not difficult to be comprehended- liquid takes it easiest way to flow from point A to point C unless an intentional barrier is set-up to cause it to take the longest path across. When the pond is becoming to be silted as indicated at the perpendicular corner, the short-circuiting would worsen over time.



Design HRT= (Length x Width x Depth) / Flowrate

To elaborate, assuming the pond is 100x40x4 meter in dimension, thus the Design HRT is (100x40x4)/ 60 ton/hr@ 11 days. In a particular badly silted situation, the effective HRT could be as low as 40% of Design HRT or 4.4 days.

With the presence of submersible mixer, the path of flow of liquid from point A to C would be disturbed and induced to flow quicker (as compared to normal) with a circular movement pattern within the lagoon. When this happens, the effective HRT is increased.

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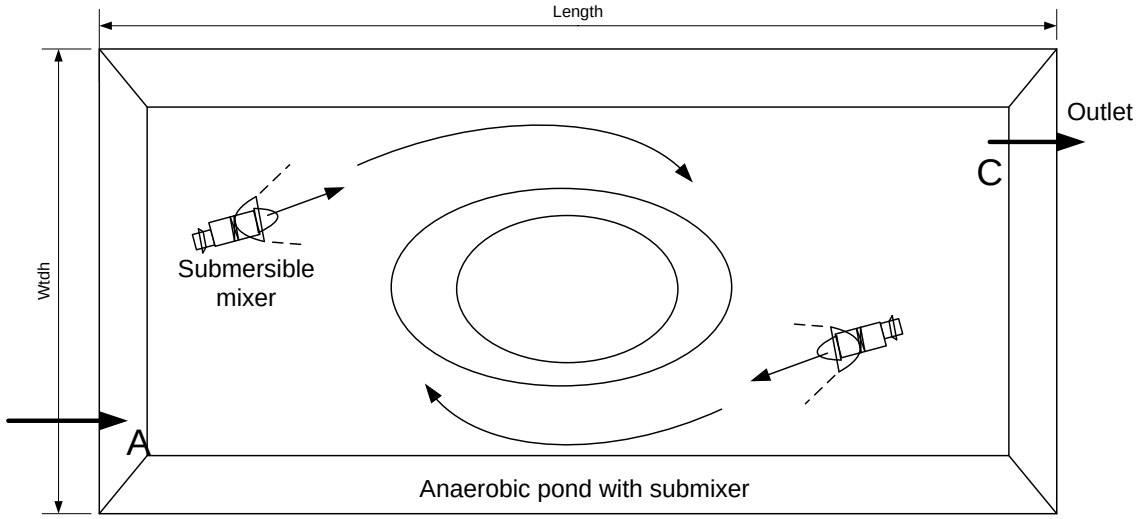

Prevention of Localized Siltation of Pond

The submersible mixer also homogenizes the overall bulk liquid and solid within the pond; and avoid the formation of island of sludge and particularly at the low flow area such as the perpendicular corner as illustrated. The low flow area is minimized and overall pond is homogenized and potential for uneven flow patches is reduced.

SUMMARY

The resultant combination effect of both the (1) preventing the short-circuiting flow pattern and (2) avoidance of formation of localized siltation and (3) increasing the within-pond circular flow is a highly optimized HRT lagoon and effectively a high performing anaerobic process.

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