Energy optimization of a Sequence Batching Membrane Bioreactor (SBMBR)

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An important aspect of SBMBR design and operation is proper aeration. Aeration plays a major role in the biological and chemical processes required to treat wastewater to appropriate levels. This process requires the bulk of the required energy inputs for MBRs.

Two types of diffusers commonly used in aeration; fine bubble porous diffusers and coarse bubble nonporous diffusers. The geometry of the bubbles produced by the fine bubble diffusers allow for a larger amount of the oxygen in the air to be transferred into the water. However, pushing the air through a porous material will require a larger power demand. A computer model was developed to better understand the tradeoffs between oxygen transfer efficiency and power consumption.

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At standard operating conditions (Ammonia: 35 mg/L COD: 250 mg/L) the model shows an 87% reduction in power to meet the requirements for COD and an 85% reduction in power to meet the requirements for the oxidation of ammonia when a fine bubble porous diffuser is used.

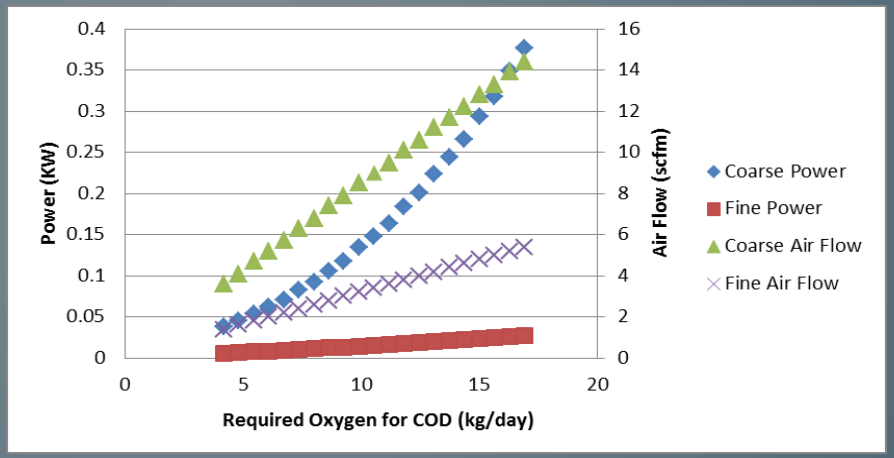

Figure 1- Power and Airflow Vs Oxygen Required for COD

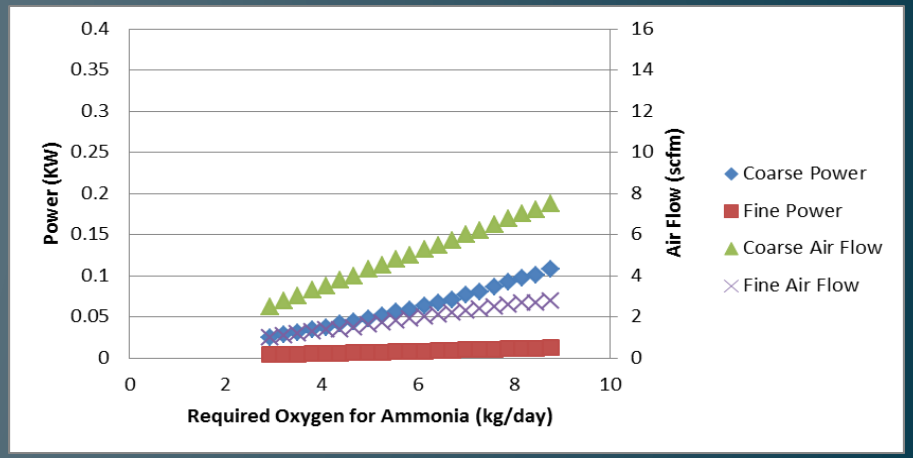

Figure 2- Power and Air Flow Vs Oxygen Required for Oxidation of Ammonia

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