



Power Cost Comparison

Comparing electrical power consumption between multiple PAS turbine aerators and one existing splash aerator in pulp wastewater.

Assumptions

1. Each existing aerator uses an 80- to 125-horsepower motor operating at 460 volts ($\pm$) and pulling an average of 98 amps.
2. Six turbine aerators at 3-horsepower each (18-hp total) operating at 460 volts ($\pm$) can inject as much dissolved oxygen as the single 80- to 100-horsepower splash aerator.
3. Each 3-horsepower turbine aerator pulls an average of 4.0 amps.
4. The turbine operates by injecting air into water and not water into air thus requiring a fraction of the horsepower to achieve the same results.
5. The water level in the basin is constant.
6. The turbine aerators would be dock-mounted in a fixed position.
7. The cost per kilowatt hour will be the same in the cost comparison for the two types of aerators (i.e. splash vs. turbine.)

Cost Comparison

Since the voltages and the cost per kilowatt hour are the same, the power consumption can be compared on the basis of the relative amperages.

6 turbine aerators at 4.0 amps each = 24.0 amps

1 splash aerator = 98 amps

$24.0 \text{ amps} \div 98 \text{ amps} = 24.5 \%$ (a 75.5 % reduction in power consumption)

If the electrical bill is, say, \$480,000 per year, and if each splash aerator were replaced with six smaller turbine aerators, the bill would drop to $0.245 \times \$480,000 = \$117,600$ or a savings of \$362,400 per year.

Benefits

1. Motor repair/replacement costs for the turbine aerators are a fraction of the cost for repairing replacing a 100-horsepower motor.
2. There is nothing to grease or maintain.
3. The retention time of the dissolved oxygen in the water is much higher with the turbine than the splash aerator due to the smaller bubble sizes. Thus, the efficiency will improve dramatically.
4. The noise level should drop significantly.
5. Because of the smaller bubble size, the dissolved oxygen will tend to migrate throughout the basin reaching all areas from top to bottom.
6. The turbine will create not only a lateral circular current, but also a downward current that can reach up to twelve feet below the surface.
7. The turbine aerator will not clog.