



شبكة المعلومات الجامعية

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ





شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكرو فيلم

قسم

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شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم



Ain Shams University
Faculty of Engineering
Mechanical Power Engineering Department

Study of Mechanical Equipment Performance in Wastewater Treatment Plants

A Thesis

**Submitted in Partial Fulfillment of the Requirements
For the Degree of M. Sc. in Mechanical Engineering**

By

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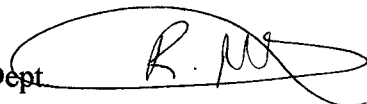
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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

* وَقُلْ رَبِّي زَكَنِي عِلْمًا *

صدق الله العظيم

STATEMENT

This thesis is submitted to Ain Shams University, Faculty of Engineering in partial fulfillment of the degree of M.Sc. in Mechanical Engineering. The work included in this thesis was carried out by the author in the Department of Mechanical Power Engineering, Ain Shams University.

No part of this thesis has been submitted for a degree or qualification at any other university or institute.

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ABSTRACT

Sulaiman Hasan Al-Aawaj. Study of Mechanical Equipment Performance in Wastewater Treatment Plants. Faculty of Engineering, Ain Shams University.

Wastewater can cause a serious pollution problems to the environment if not treated and disposed safely. Biological treatment using activated sludge process represents the most common type of wastewater treatment. Surface aerators which is used to provide the treatment process with the required oxygen is cheap, easy in operation and maintenance and has almost no troubleshooting, however surface aerator is power consuming equipment.

The aim of present research is to study the different engineering design parameters which affect the performance of the surface aerators. For this purpose, a pilot plant aeration tank has been designed and constructed in the Sanitary Engineering Laboratory, Public Works Department. The volume of aeration tank was one cubic meter. All experiments were conducted on tap water, and sodium sulfite was used to reduce the dissolved oxygen of water to zero.

The results of experimental work showed that the performance of the aerators is enhanced by increasing the rotational speed, number and area of blades, and diameter of aerator. Increasing the immersion of aerator blades in water, revealed to improve the performance up to an immersion equal to approximately 0.15 of the water depth in aeration tank.

The results of the research indicated that the optimum performance of the surface aerators was obtained at rotational speed of aerator of about 205 rpm, and diameter not exceed $1/5$ of the aeration tank width.

Key Words:

Surface Aerator; Aeration Process; Oxygen Mass Transfer; Oxygenation Capacity; Wastewater Treatment; Wastewater Equipment.