Ain Shams University
Faculty of Engineering

SOIL CUTTING

By

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A Thesis
Submitted in Partial Fulfillment of
The Requirement for the
Degree of Master of Science
In
Structural Engineering

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Statement

This dissertation is submitted to Ain Shams University for the degree of ***Master of Science*** in Civil Engineering.

The work included in this thesis was carried out by the author in the ***Department of Structural Engineering***, Facutly of Engineering, Ain Shams University, from October 1988 to October 1994.

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

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بسم الله الرحمن الرحيم

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Abstract :

The principal purpose of the problem which forms the basis of this study was to look into the possibility of providing a rational analytical solutions for predicting the forces on a cutting blade driven horizontally into a loose sand. However, such analytical solution must be checked by a selected number of experimental tests to verify their accuracy. In this study the mathematical solution using a limit analysis theories based on the relationship between the horizontal force and the direction of movement for a given set of soil strength parameter's and a given plate configuration. The observation of soils under conditions of failure often resent the basis for the development of important theorems leading a solutions for forces and deformations at failure.

A glass-sided tank was designed to accomplish the observation and phtographing of the total soil failure zone. A series of experimental tests performed by using cutting blades with different angles of inclination-rigidly attached to a carriage and moved through a loose sand at specified constant speed and various depths of cut. The purpose of the experimental programme was to provide data on the interaction of the chosen cutting blades embedded in frictional soil under plane strain conditions which could be compared with anlaytical results. Mainly the following facts were investigated.

1. The lood-displacement response of the soil.
2. The soil deformation field.
3. Failure mechanisms.

Test results showed that the experimental observations verified the postulated failure modes. Moreover, there was fairly good agreement between the predicted forces and the experimentaly measured ones.

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