Cairo University

REDUCING THE ENGERY CONSUMPTION WITH RESPONSIVE ARCHITECTURE IN THE HOT ARID REGIONS

By

Merna Hany Sabry Ibrahim

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
in
Architectural Engineering

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT

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Under the Supervision of

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Title of Thesis:

Reducing the Energy Consumption with Responsive Architecture in the Hot Arid Regions

Key Words:
Responsive Architecture; Adaptive Skins; Kinetic Shading Devices; New Facades Concepts; the Living Facade.

Summary:

Egypt is located in a hot arid region where a very hot climate, high temperature and high solar radiations is occurred. On the other side, large numbers of buildings are designed without taking into considerations the hot climate which Egypt is located in. Nowadays, large numbers of buildings are constructed with façades fully covered with glazing systems which are highly exposed to the high solar radiation and thus resulting in an uncomfortable indoor environment. An intensive HVAC (Heating, ventilation and air conditioning) system is used to maintain the comfortable indoor environment and reduce the unwanted conditions. As a result, the energy are consumed on a large scale, producing carbon emission and increasing rapidly the environmental pollution.

The thesis aims to prove that the responsive architecture reduces the energy consumption in buildings which are located in Egypt. It determines the most efficient type of responsive architecture in reducing the energy consumption in building located Egypt. It also determines the percentage of reducing the energy consumption due to applying responsive façade.

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Dedication

This thesis is dedicated to my dearest mother, my fiancé and my supervisor (Prof. Emad Aly El-Dine El Sherbiny).

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