شبكة المعلومات الجامعية

بسم اللّه الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم باللّه العظيم أن المادة التي تم توثيقها وتسجيلها علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

شبكة المعلومات الجامعية

بعض الوثائق الأصلية تالفة

بالرسالة صفحات
لم ترد بالأصل

EFFECT OF ADAPTIVE SOLAR FAÇADES ON DAYLIGHT AND GLARE FOR OFFICE BUILDINGS -AN ANALYTICAL STUDY IN HOT ARID CLIMATE OF EGYPT

By

Doaa Ahmed Mohamed Ali

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
2020

EFFECT OF ADAPTIVE SOLAR FAÇADES ON DAYLIGHT AND GLARE FOR OFFICE BUILDINGS -AN ANALYTICAL STUDY IN HOT ARID CLIMATE OF EGYPT

By
Doaa Ahmed Mohamed Ali

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

Under the Supervision of

Prof. Dr. Ahmed Ahmed Fikry

……..

Professor of Architecture and
Environmental Design
Architectural Engineering Department
Faculty of Engineering, Cairo University

Associate Prof. Dr. Reham El-Dessuky Hamed

……..

Associate Professor of Architecture
Architectural Engineering Department
Faculty of Engineering, beni-suef University

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT
2020

EFFECT OF ADAPTIVE SOLAR FAÇADES ON DAYLIGHT AND GLARE FOR OFFICE BUILDINGS -AN ANALYTICAL STUDY IN HOT ARID CLIMATE OF EGYPT

By
Doaa Ahmed Mohamed Ali

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

Approved by the
Examining Committee

_____
Prof. Dr. Ahmed Ahmed fikry, Thesis Main Advisor

_____
Associate Prof. Dr. Reham El-Dessuky,Advisor
- Associate Professor of Architecture Architectural Engineering Department Faculty of Engineering, beni-suef University

_____
Prof. Dr. Ahmed Reda Abdin, Internal Examiner

_____
Prof. Dr. Morad Abdelkader Abdelmohsen,External Examiner
- Professor of Architecture and Environmental Control Department of Architecture Faculty of Engineering Ain Shams University

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT
2020

Engineer's Name: Doaa Ahmed Mohamed Ali
Date of Birth: 12/8/1994
Nationality: Egyptian
E-mail: doaa.mohamed8@eng1.cu.edu.eg
Phone: 01129419325
Address: 6th October city
Registration Date: 1/10/2017
Awarding Date: 2020
Degree: Master of Science
Department: Architectural Engineering

Supervisors:
-Prof. Dr. Ahmed Ahmed fikry
-Associate Prof. Dr. Reham El-Dessuky Hamed

Examiners:
-Prof. Dr. Ahmed Ahmed fikry (Main advisor)
-Associate Prof. Dr. Reham El-Dessuky Hamed (advisor)
Associate Professor of Architecture Architectural Engineering Department Faculty of Engineering, beni-suef University
-Prof. Dr. Ahmed Reda Abdin(Internal examiner)
-Prof. Dr. Morad Abdelkader Abdelmohsen(External examiner) Professor of Architecture and Environmental Control Department of Architecture Faculty of Engineering Ain Shams University

Title of Thesis:

Effect of Adaptive Solar Façades on Daylight and Glare for Office Buildings
-An Analytical Study in Hot Arid Climate of Egypt

Key Words:
Visual comfort; Glare; Daylighting; Adaptive façades; Rhino software

Summary

The research provides an evaluation of the effect of adaptive facades on both natural lighting and glare for administrative buildings, where administrative buildings are one of the largest energy consumers in Egypt, and industrial lighting represents a large proportion of the total annual energy consumed and with the aggravation of the energy crisis, this places great importance to rationalize energy consumption .

The use of the optimization method proposed in this study succeeded in providing a wide range of design variations. This allowed for showing the effectiveness of using the proposed parametric approach in identifying a large number of unconventional designs that maintain maximum daylighting performance. The genetic algorithm adopted in this study enhanced daylighting performance during the optimization process gradually through 50 Generations, by which the objective was set to maximize daylit area percentage and to minimize the over-lit and partially daylit area percentages. In the last generation, by the end of the optimization process, optimum solutions were defined. These all met the targeted criteria.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Doaa Ahmed Mohamed Ali

Date:

Signature

Dedication

To my Mom, Dad, Sister& brothers For all your Support, Encouragement and Unconditional love

Acknowledgments

First and foremost, I thank **ALLAH**, with whom truly all things are possible. This thesis is proof of that.

I would like to express my sincere gratitude to my supervisors;

Prof. Dr. Ahmed Ahmed Fikry and Dr. Reham El-Dessuky for their supervision, guidance, valuable advice, innovative ideas, encouragement, support, endurance, enthusiasm and dedication throughout this thesis.

I am grateful to thank all the university members for their kindness and continuous support.

Finally, I wish to acknowledge **my parents and family members** for their blessing, love, support, and belief in me during my life.

Doaa Ahmed Mohamed

Table of Contents