IMPROVEMENT OF THERMAL ENERGY EFFICIENCY OF OFFICE BUILDINGS BY INTEGRATION OF PASSIVE AND ACTIVE TECHNIQUES

By

Eng. Ahmed Mohamed Ahmed Abbady

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
MECHANICAL POWER ENGINEERING

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Under the Supervision of

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Title of Thesis:

Improvement of thermal energy efficiency of office buildings by integration of passive and active techniques

Key Words:
Energy Savings; Energy Efficiency; Energy in Buildings; Administrative Buildings; Low Energy Buildings.

Summary:

Egypt expands in building of new energy efficient buildings especially non-residential buildings such as commercial buildings and office buildings, where energy saving is very important to face the lack of energy availability and cost in Egypt. This research presents a framework for using simulation-based optimization approach to improve the thermal performance and reducing primary energy consumption from a HVAC and lightening systems in office buildings by studying an administrative office building as a case study. This case study building is located in Smart Village (West of Cairo) which is considered as one of the biggest administrative and IT office compounds in Egypt, also is likely to be a replicated model in the future to become a group of smart villages or administrative areas in Egypt soon.

The research investigates the influence of integration of passive and active options and their alternatives to achieve energy efficient performance of the building, where the passive options are the options that related to design of building construction fabric, building layout, and climate of a region. While the active options are the options related by the use of mechanical and electrical systems required to run the building.

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: Ahmed Mohamed Ahmed Abbady Date:

Signature:

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I am heartily thankful to my parents, who always support me and especially to accomplish this work and;

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