CERTIFICATION OF APPROVAL

Study on the Air Conditioning Cooling Load and Operational Practices within Glazed Buildings in Universiti Teknologi PETRONAS

by

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A project dissertation submitted to the
Mechanical Engineering Programme
Universiti Teknologi PETRONAS
in partial fulfilment of the requirement for the
BACHELOR OF ENGINEERING (Hons)
(MECHANICAL ENGINEERING)

Approved by,

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January 2009

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

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ABSTRACT

The centralized air conditioning system in Universiti Teknologi PETRONAS is a large scale air conditioning application, in which the average monthly consumption reaches as high as 850,000 RTh. For such a huge amount of energy consumption, the system has vast potential for energy and cost saving. Therefore, a thorough study on the cooling load of the whole system should be performed to identify potential areas for energy and cost saving. The objective of the present study is to investigate the potential energy savings within the air conditioning system. The study is conducted by analyzing the system's cooling load and the operational practices, both manually and by software simulation. For cooling load analysis, the effect of several design and operational variables towards building annual cooling energy are analyzed in terms of the building orientation, thermal insulation, night ventilation, window shading devices, infiltration and overcooling towards building annual cooling energy. On the operational side, building occupancy pattern is investigated. This involved analyzing the occupancy pattern during weekday and weekend as well as estimating the energy saving by isolating the unoccupied spaces. From the simulations' results, implementation of windows blinds and shadings as well as providing night ventilation give a significant reduction of buildings' annual cooling energy. For the operational practices, implementation of rooms' scheduling for the air conditioning system will also result in a substantial reduction of building cooling load.

ACKNOWLEDGEMENT

I would like to take this opportunity to acknowledge and thank everyone that has given me all the supports and guidance throughout the whole period of completing the final year project. Firstly, many thanks to the university and the Final Year Project coordinators that have coordinated and made the necessary arrangements, especially in terms of the logistics, for this study.

I must also acknowledge the endless help and support received from my supervisor, Ir. Dr. Shaharin Anwar Sulaiman throughout the whole period of completing the final year project. His guidance and advices are very much appreciated. Apart from that, many thanks to the UTP Property Management and Maintenance Department (PMMD UTP) Engineer, Mr. Fatimie Irzaq Khamis and Mr. Foong Kok Keong for helping me in arranging for the completion of a few experiments on the air conditioning system.

I would also like to express my utmost gratitude to my fellow FYP partners Ms. Fara Husna Thambi and Ms. Siti Nurfadilah Ahmad Mujor for their continous support upon the completion of my research work.

Finally many thanks to my fellow colleagues for their help and ideas throughout the completion of this study. Thank you all.

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ABREVIATIONS AND NOMENCLATURES

AHU	Air Handling Unit
ASHRAE	American Society of Heating Refrigeration and Air Conditioning Engineer
BLAST	Building Loads Analysis and Systems Thermodynamics
CFD	Conduction Finite Difference
CFM	Conduction Transfer Function
CLF	Cooling Load Factor
CLTD	Cooling Load Temperature Difference
CTF	Cubic Feet per Minute
DB	Dry Bulb
GLF	Glass Load Factor
HB	Heat Balance
HVAC	Heating Ventilation and Air Conditioning
SC	Shading Coefficient
SHGF	Solar Heat Gain Factor
TFM	Transfer Function Method
UTP	Universiti Teknologi PETRONAS
VAV	Variable Air Volume
VSD	Variable Speed Drive
WB	Wet Bulb