UNIVERSITI TEKNOLOGI MARA

CFD SIMULATION OF DUCTING CONFIGURATIONS ON THE FLOW DISTRIBUTION INSIDE WAITING AREA OF A HOSPITAL

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Dissertation submitted in partial fulfillment
of the requirements for the degree of
Master of Science
(Mechanical Engineering)

Faculty of Mechanical Engineering

April 2021

AUTHOR'S DECLARATION

I declare that the work in this dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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Faculty	: Mechanical Engineering
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ABSTRACT

An enclosed environment which is designed to offer the occupants with a pleasant temperature for the body and good air quality should be built. Computational fluid dynamics (CFD) technique is being used in this study by determine the locations of air supply and return diffuser, using the various air parameters such as the air velocity and temperature. A three-dimensional room model for Obstetrics & Gynecology (O&G) Emergency Department (ED) waiting area, Hospital Tunku Azizah was created in CFD for this study. The purpose of this research is to evaluate the air flow pattern inside the room using the original supply and return air diffuser configuration. This research also aim to investigate the cooling air distribution and the effect of the thermal changes inside the room using the current Cubic Feet per Minute (CFM) reading taken at supply and return diffuser for the room. The placement of the supply and return air diffuser as well as the amount of circulated air is an important factor in the design of the room, as it affects human comfort conditions and thus staff and patient's health and staff performance. Further, the study showed various supply and return air configurations were tested and it was found the maximum advantage was achieved by a certain configuration of supply and return air which it is allowing the improvement of air quality for the room. The ideal comes from the large number of air supply inlets, a feature that would not be implemented through building a design. Even in an optimum comfort air conditioner, the optimal thermal conditions around the occupant can be, with a variety of air supply inlets at appropriate locations. In overall, all the 4 new designs have been compared with the original design. The results indicated that New Design 4 shows the best result among the others where New Design 4 did not showed any of increasing of temperature and the reading is 22.99 ^{o}C. Results for velocity distribution also showed the highest velocity air distribution and most of the area covered with range from 0 m/s to 0.65 m/s.

ACKNOWLEDGEMENT

In the name of Allah, the Most Gracious and the Most Merciful. All praises to Allah SWT, for the strengths and blessing He had given in completing the research. Firstly, the writer would like to gives his appreciation to Dr. Mohd Faizal Bin Mohamad for his generous support, patience, vision and ideas to conduct the simulation and analysis successfully. The writer also would like to thank him for providing the knowledge and assistance.

The writer also wish to express his deep and sincere gratitude to all lecturers and friends from MEC 703 programs for the knowledge sharing, experiences and memories given during his time throughout the post graduate study.

Last but not least, the writer would like to extend his appreciation towards friends and family members who have given their time whether directly or indirectly in giving their support, advice, prayers and encouragements throughout the completion of this research. The memorable experiences in completing this research will be a pleasant and unforgettable memories the writer will have in UiTM Shah Alam.

TABLE OF CONTENTS