UNIVERSITI TEKNOLOGI MARA

LIQUID COOLED CLADDING SYSTEM

MUHAMMAD HILMI BIN ISNAINI

Innovation project report submitted in partial fulfilment of the requirements for the degree of

Bachelor of Science (Hons.) Construction Technology

Department of Built Environment Studies and Technology

August 2022

AUTHOR'S DECLARATION

I declare that the work in this innovation project report 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 topic has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

In the event that my innovation project report, be found to violate the conditions mentioned above, I voluntarily waive the right of conferment of my degree and agree be subjected to the disciplinary rules and regulations of Universiti Teknologi MARA.

Name of Student	: Muhammad Hilmi bin Isnaini
Student ID	: 2019678986
Programme	: Bachelor of Science (Hons.) Construction Technology
Faculty	: Department of Built Environment Studies and Technologies
Innovation Title	: Liquid Cooled Cladding System
Student's Signature	:
Date	: 2/5/2022

ACKNOWLEDGEMENT

Alhamdulillah, all praised be upon Him, the Most Merciful, the Most Gracious that grant me a willingness, spirit, and dedication to accomplish this BCT654 Innovation Project II. I wanted to express my appreciation and gratitude to all individual who involve in this innovation project either directly or indirectly. I also wanted to give a special thanks to my supervisor, Pn. Wan Nordiana binti Wan Ali and my lecturer for this course, Dr. Asmat binti Ismail for guiding me in conducting this innovation project. Last but not least, I would like to thank to my mother and all my siblings for the support and encouragement to me in completing this project.

ABSTRACT

The use of aluminium composite panel (ACP) as the exterior wall cladding has been proven in reducing the electric energy used to keep the room in a building at a thermal comfort. Indirectly, this component had saved the fossil fuels sources from being burnt to convert it into electricity. Unfortunately, most of ACP cladding that being used in Malaysia contained a flammable or combustible material and there are a lot of manufactured components used in the cladding which produce a large amount of carbon footprints. This innovation project is conducted to innovate the way the exterior wall cladding functioning by using a liquid cooling system. The purpose of this innovation project is to give an alternative to the common non-fire retardant (FR) ACP wall cladding. Instead of using polyethylene (PE) or mineral wool as the inner core layer, this *Liquid-Cooled Cladding system* (LCCS) will use a liquid to fill up the air cavity of the cladding that made up from a metal. This system is absolutely fire safe and suitable to be used on hostel building. It also aims to provides a better cooling effect compared to the PE core cladding. Lastly, the LCCS is intended to reduce the carbon footprints by using less manufactured components.

TABLE OF CONTENTS

AUTHOR'S DECLARATION **i**

ACKNOWLEDGEMENT **ii**

ABSTRACT **iii**

List of Tables. **vii**

List of Figures. **viii**

List of Abbreviation and Glossary. **ix**

List of Symbols. **x**

CHAPTER 1 **1**

INTRODUCTION **1**

1.1 Introduction 1

1.2 Problem Statement 2

1.3 Research Questions 3

1.4 Aim and Objectives 3

1.5 Scope of Innovation Project 4

1.6 Limitation of Innovation Project 4

1.7 Significance of Innovation Project 4

CHAPTER 2 **5**

LITERATURE REVIEW **5**

2.1 Definition Exterior Wall Cladding 5

2.2 Types and Characteristics of Exterior Wall Cladding 5

2.3 Advantages and Disadvantages of Metal Sheet Cladding 6

2.4 ACP Cladding Installation Method 6

2.5 Combustible Material 7

2.6 Manufacturing of Polyethylene (PE) 10

2.7 Manufacturing of Stone Wool 11

2.8 Carbon Footprint Contributes to Global Warming 12