

**MECHANICAL AND PHYSICAL PROPERTIES OF WOOD CEMENT
BOARD FROM OIL PALM TRUNK AND RICE HUSK IN RELATION TO
PARTICLES:CEMENT RATIO**

FATIN AMIERA BINTI OMAR

**Final Year Project Report Submitted in
Partial Fulfillment of the Requirements for the
Bachelor of Science (Hons.) in Furniture Technology
In the Faculty of Applied Sciences
Universiti Teknologi MARA**

JULY 2014

ACKNOWLEDGEMENT

Assalamualaikum w.b.t.

In the name of Allah, most gracious more merciful. First and foremost, I tend to express my sincere gratitude to my advisor, Dr Shaikh Karim Yamani bin Zakaria who was abundantly helpful and offered invaluable assistance, guidance and support along my journey to complete this thesis project. Deepest gratitude is also due to the co-advisor, Encik Hashim bin Wan Samsi for inspiring me greatly to complete this thesis. His willingness to motivate me contributed tremendously to my thesis. In addition to that, I also like to thanks Associate Prof. Dr. Wan Mohd Nazri Bin Wan Abdul Rahman and other lecturers for their energy, commitments and superb ideas in helping me completing my thesis. Special thanks also to Encik Jalali bin Salleh and Encik Nabil Fikri bin Suhaimi, Encik Ali bin Karim, and all members and classmates in B.Sc. (Hons.) in Furniture Technology in contributing their energy and time to help me in fulfilling my task in thesis. Thousands of gratitude I wish to assistants of UiTM Pahang's workshop for their willingness to help me and spend their leisure time to help in in completing my thesis. Finally, I also would like to thanks my beloved families especially my parents Encik Omar bin Ali and Puan Ruaizah binti Hj. Jono who gave me full support and encouraging me to pursue this thesis degree. Without helps of the particular that mentioned above, I would not have finished this final year project.

Thank You.

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	iii
TABLE OF CONTENTS	iv - vi
LIST OF TABLES	vii
LIST OF FIGURES	viii
LIST OF PLATES	ix
LIST OF ABBREVIATIONS	x
ABSTRACT	xi
ABSTRAK	xii
CHAPTER I INTRODUCTION	
1.1 Background	1- 5
1.2 Problem statement	5
1.3 Justification of study	6
1.4 Objectives	6
CHAPTER II LITERATURE REVIEW	
2.1 Wood based panel product	7
2.1.1 Wood Cement Board (WCB)	7 - 8
2.1.2 History of Wood Cement Board	8 - 9
2.1.3 Physical Properties of WCB	9 - 10
2.1.4 Mechanical Properties of WCB	10
2.2 Overview Of Oil Palm in Malaysia	10 - 12
2.2.1 Characteristics of Oil Palm	12 - 13
2.2.2 Anatomy of Oil Palm	13 - 15
2.2.3 Physical Properties of Oil Palm Trunk	15
2.2.3.1 Density	15 - 16
2.2.3.2 Moisture Content	16 - 17
2.2.3.3 Shrinkage	17
2.2.4 Mechanical Properties of Oil Palm Trunk	18 - 19
2.2.5 Chemical composition of Oil Palm Trunk	19 - 20
2.3 Rice Husk	20 - 21
2.3.1 Overview of Rice Husk in Malaysia	21 - 22
2.3.2 Characteristics of Rice Husk	22

2.3.3	Chemical Composition of Rice Husk	22 - 24
2.3.4	Utilization Of Rice Husk	24 - 25
2.4	Ordinary Portland cement (OPC)	25 - 26
2.5	Effects of cement Ratio	26

CHAPTER III METHODOLOGY

3.1	Raw materials	
3.1.1	Oil Palm Trunk and Rice Husk	27 - 28
3.1.2	Ordinary Portland cement (OPC)	28
3.1.3	Chemical additives	28 - 29
3.2	Material Preparation	
3.2.1	Material preparation of Oil Palm Trunk (OPT)	29
3.2.2	Chipping Process	30
3.2.3	Flaking Process	30
3.3	Determination of Moisture Content	30 - 31
3.4	Particle analysis	31
3.5	Bulk density	31 - 32
3.6	Wood Cement Board Manufacturing	
3.6.1	Board manufacturing process	32
3.6.1.1	Blending Process	32 - 33
3.6.1.2	Mat Forming	33 - 34
3.6.1.3	Cold Hydraulic Press	34 - 35
3.6.1.4	Conditioning Chamber	35 - 36
3.6.1.5	Curing or Conditioning Process	37
3.6.1.6	Board Cutting	37 - 38
3.7	Determination of flexural strength in WCB	38 - 39
3.8	Determination of Internal Bonding (IB)	39 - 40
3.9	Determination of physical testing in WCB	40
3.9.1	Water absorption (WA)	40 - 41
3.9.2	Thickness swelling (TS)	41

CHAPTER IV RESULTS AND DISCUSSION

4.1	Properties of Wood Cement Board (WCB)	43 - 44
4.2	Statistical significance	44 - 45
4.3	Effects of material on the physical and mechanical properties of WCB	45 - 46

ABSTRACT

MECHANICAL AND PHYSICAL PROPERTIES OF WOOD CEMENT BOARD FROM OIL PALM TRUNK AND RICE HUSK IN RELATION TO PARTICLES:CEMENT RATIO

An experimental study was conducted to determine the physical and mechanical properties of Wood Cement Board (WCB) made from Oil Palm Trunk (*Elaeis guineensis Jacq.*) and Rice husk particles. Different particles: cement ratio (1:2.5, 1:2.75 and 1:3.0) was applied. The target board density was set at 1300 kg/m³. The mechanical (bending test and internal bonding test) and physical (water absorption test and thickness swelling test) properties of the WCB were evaluated. From this study, it showed that there is a highly significant difference on the physical and mechanical properties of WCB on the effect of different material. The result for internal bonding (IB), water absorption (WA) and thickness swelling (TS) of WCB from OPT meet the requirement standard of MS544:2001. Moreover, based on the application of different wood cement ratio, there is no significant difference for all testing except for internal bonding (IB) test. However, the result showed that mechanical and physical properties of WCB increase as the increasing of cement ratio.