

**PROPERTIES OF OIL PALM FROND – PLASTIC COMPOSITE**  
*(Elaeis guineensis)*

**MUHAMMAD HAFIZ BIN ABD KADIR**

**Final Year Project Report Submitted in  
Partial Fulfilment of the Requirement for the  
Degree of Bachelor of Sciences (Hons.) Furniture Technology  
in the Faculty of Applied Sciences  
Universiti Teknologi MARA**

**JANUARY 2012**

### Candidate's Declaration

I declare that the work in this thesis was carried out in accordance with the regulations of University Teknologi MARA. It is original and is the result 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 other degree or qualification.

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

Name of Candidate : Muhammad Hafiz bin Abd Kadir  
Candidate's ID No. : 2010258204  
Programme : AS227  
Faculty : Applied Science  
Thesis Title : Properties of Oil Palm Frond – Plastic Composite  
(*Elaeis Guineensis*)  
Signature of Candidate .....  
Date ..... 12/1/2012

**PROPERTIES OF OIL PALM FROND – PLASTIC COMPOSITE  
(*Elaeis guineensis*)**

By

**MUHAMMAD HAFIZ BIN ABD KADIR**

**JANUARY 2012**

**ABSTRACT**

Plastic composite are being expanded currently. It constructed by composition with wood fiber and plastic. This research is to determine about the mechanical and physical properties of plastic composite from 3 different ratios of wood filler. The small clear specimen of oil palm frond plastic composite was created and separated with 5 testing that bending, tensile, impact, thickness swelling and water absorption. Small particle give higher result in mechanical properties such as bending, tensile and impact test compared to another size. Besides that, physical properties give inverse result from mechanical properties.

## TABLE OF CONTENTS

	PAGE
<b>APPROVAL SHEET</b>	ii
<b>CANDIDATE'S DECLARATION</b>	iii
<b>DEDICATION</b>	iv
<b>ACKNOWLEDGEMENTS</b>	v
<b>ABSTRACT</b>	vi
<b>ABSTRAK</b>	vii
<b>LIST OF TABLES</b>	x
<b>LIST OF FIGURES</b>	xi
<b>LIST OF PLATES</b>	xii
<b>LIST OF ABBREVIATIONS</b>	xiii
<b>1 INTRODUCTION</b>	
1.1 Background	1
1.2 Problem Statement	3
1.3 Justification	4
1.4 Objectives	5
<b>2 LITERATURE REVIEW</b>	
2.1 Oil Palm	6
2.1.1 History of Oil Palm	7
2.1.2 Distribution of Oil Palm Planted Area by State and Category	7
2.2 Characteristic of Oil Palm Frond	8
2.2.1 General Characteristic	8
2.2.2 Anatomy	8
2.2.3 Chemical Properties of Oil Palm Frond	9
2.3 Plastic Composite	10
2.4 Plastic	11
2.5 Potential of Lignocellulosic Plastic Composite	11
2.6 Polypropylene	13
2.7 Effect of Particle Geometry	14
2.8 Effect of Filler Loading	16
<b>3 MATERIALS AND METHODS</b>	
3.1 Process of Oil Palm Frond Plastic Composite	17
3.2 Source of Raw Material	18
3.3 Raw Material Preparation	18
3.3.1 Grinding and Screening	18
3.3.2 Bulk Density	19
3.3.3 Drying	19
3.4 Board Making	19
3.4.1 Measuring the Raw Material	19
3.4.2 Blending in the Dispersion Mixer	20

3.4.3	Making Thermoplastic Pallet	21
3.4.4	Molding Process	22
3.4.5	Pressing	23
3.4.6	Sample Cutting and Conditioning	23
3.4.7	Cutting for Testing	24
3.5	Method of Testing	26
3.5.1	Physical Properties	26
3.5.1.1	Thickness Swelling and Water Absorption Testing	26
3.5.2	Mechanical Properties	27
3.5.2.1	Bending Test	27
3.5.2.2	Tensile Test	29
3.5.2.3	Impact Test	30
<b>4</b>	<b>RESULTS AND DISCUSSIONS</b>	
4.1	Mechanical Properties	31
4.1.1	Bending Strength (MOR)	31
4.1.2	Bending Strength (MOE)	32
4.1.3	Tensile Strength (MOR)	34
4.1.4	Tensile Strength (MOE)	35
4.1.5	Impact Strength	36
4.2	Physical Properties	37
4.2.1	Thickness Swelling	37
4.2.2	Water Absorption	38
4.3	ANOVA Analysis	39
<b>5</b>	<b>CONCLUSIONS AND RECOMMENDATIONS</b>	<b>40</b>
	<b>REFERENCES</b>	<b>41</b>
	<b>APPENDICES</b>	<b>45</b>
	<b>VITAE</b>	<b>56</b>