

UNIVERSITI TEKNOLOGI MARA

**MECHANICAL PROPERTIES OF COMPOSITE
PANEL FROM SUGARCANE BAGGASE, OIL
PALM FROND AND FIBERGLASS – AN
ALTERNATIVE FOR FURNITURE MATERIAL**

FAREEZAL BIN ABD. WAHAB

Thesis submitted in fulfillment of the requirements for the
Bachelor of Furniture Technology

Faculty of Applied Sciences

May 2011

TABLE OF CONTENTS

	Page
APPROVAL SHEET	i
TABLE OF CONTENTS	ii
ACKNOWLEDGEMENT	iv
LIST OF TABLES	v
LIST OF FIGURES	vi
LIST OF PLATES	vii
LIST OF ABBREVIATIONS	viii
ABSTRACT	ix

CHAPTER I

1.0 INTRODUCTION

1.1 Background	1
1.2 Problem Statement and Justification	2
1.3 Objectives	3

CHAPTER II

2.0 LITERATURE REVIEW

2.1 Composite Material	4
2.1.1 Types of Composite Material	4
2.1.2 Earliest Examples of Composite Materials	5
2.1.3 Modern Composite Material	5
2.2 Fiberglass	6
2.2.1 Fiber Formation	6
2.2.2 Uses	7
2.3 Sugarcane Bagasse	8
2.4 Oil Palm Frond Fiber	8
2.5 Arcylic Resin	9
2.6 Testing Method	10
2.6.1 Bending Strength Test	10
2.6.2 Tensile Strength Test	12

CHAPTER III

3.0 METHODOLOGY

3.1	Material Used	13
3.2	Materials	16
	3.2.1 Raw Fiberglass	16
	3.2.2 Sugarcane Baggase	16
	3.2.3 Oil Pam Frond	17
	3.2.4 Acylic Resin	18
	3.2.5 Mold Release Wax	19
	3.2.6 Organic Peroxide	19
3.3	Method for the Manufacturing of the Composite Panel	20
	3.3.1 Mixing	21
	3.3.2 Preparing Mould	21
	3.3.3 Fiberglass Layer	21
	3.3.4 Sugarcane Baggase Fiber Layer	21
	3.3.5 Oil Palm Frond Fiber Layer	22
	3.3.6 Sugarcane Baggase Fiber and Oil Palm Frond Fiber Layering	22
	3.3.7 Clamping and Conditioning	22
	3.3.8 Trimming	23
3.4	Testing Method	24
	3.4.1 Bending Strength Test	24
	3.4.2 Tensile Strength Test	25

CHAPTER IV

4.0 RESULTS AND DISCUSSIONS

4.1	Mechanical Properties of the Composite Panel	26
4.2	Statistical Significance	27
4.3	Effects of Fiber Source	27
	4.3.1 FMOE	28
	4.3.2 FMOR	29
	4.3.3 TMOE	30
	4.3.4 TMOR	31
4.4	Percentage of Cellulose and Lignin	32

CHAPTER V

5.0	CONCLUSION AND RECOMMENDATIONS	33
	REFERENCES	34
	APPENDICES	35
	VITAE	45

LIST OF TABLES

Table		Page
4.1	Results for the Mechanical Properties of the Composite Panel	27
4.2	Summaries of Statistical Significance	27
4.3	Percentage of Cellulose and Lignin	32

MECHANICAL PROPERTIES OF COMPOSITE PANEL FROM SUGARCANE BAGGASE, OIL PALM FROND AND FIBERGLASS – AN ALTERNATIVE FOR FURNITURE MATERIAL

ABSTRACT

Readily available agriculture fibers such as sugarcane bagasse fibers and oil palm frond fibers were mixed with fiberglass to produce composite panels in the hope to study the mechanical properties (bending and tensile) in accordance to the ASTM standard. The composite panel produced from sugarcane bagasse fibers and fiberglass gave bending strength of 3934.23 MPa and 80.16 MPa for MOE and MOR respectively. The tensile strength values were 5742.25 MPa for MOE and 34.76 MPa for MOR. The bending strength values of composite panel made from oil palm frond fibers and fiberglass were 4321.27 MPa for MOE and 94.31 MPa for MOR, while the tensile strength values were 5590.45 MPa and 32.87 MPa for MOE and MOR respectively. On the other hand, composite panel produced from sugarcane bagasse fibers, oil palm frond fibers and fiberglass resulted in bending strength values of 4376.40 MPa for MOE and 99.58 MPa for MOR. Meanwhile the tensile strength values were 6023.53 MPa for MOE and 35.72 MPa for MOR. It can therefore be concluded that oil palm frond fibers when combined with fiberglass produced more flexible composite panel and thus possesses higher potential for alternative material for the furniture industry.