

**PROPERTIES OF PARTICLEBOARD MADE FROM *ACACIA*
MANGIUM AND OIL PALM TRUNK IN RELATION TO
DIFFERENT RESIN CONTENT**

NOR AIN NADIRAH BINTI YUSOFF

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

JULY 2014

ACKNOWLEDGEMENT

بسم الله الرحمن الرحيم

In the name of Allah, most gracious more merciful. First and foremost, I tend to express my sincere gratitude to my advisor, Dr. Shaikh Abdul Karim Yamani bin Zakaria who was abundantly helpful and offered invaluable assistance, guidance and support along my journey to complete this thesis. Deepest gratitude is also for my project coordinator, Prof. Madya Dr. Wan Mohd Nazri bin Wan Abdul Rahman 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 , Miss Nurussyahidah Tahreb and other lecturers for their energy, commitments and superb ideas in helping me completing my thesis. Special thanks also to all members in Bachelor of Furniture Technology in contributing their energy and time to help me in fulfilling thesis task. Not to be forgotten, thousand of gratitude I gave to factory assistants at UiTM Pahang's workshop for helping me in completing my thesis. Last but not least, I also would like to thanks my parents who pray for me every day and night for my success in my study and sharing their ideas in completing my thesis. Without the helps from the particular people that mentioned above, surely I would face many difficulties while completing this thesis.

TABLE OF CONTENTS

	Page
CANDIDATES DECLARATION	iii
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENTS	v
LIST OF TABLES	vii
LIST OF FIGURES	viii
LIST OF PLATES	ix
LIST OF ABBREVIATIONS	x
ABSTRACT	xi
ABSTRAK	xii

CHAPTER 1 INTRODUCTION

1.1	Background of study	1
1.2	Research problems of study	6
1.3	Justification of study	8
1.4	Objectives of study	9

CHAPTER 2 LITERATURE REVIEW

2.1	Overview of wood based industry in Malaysia	10
2.2	Particleboard	11
2.3	<i>Acacia mangium</i>	14
	2.3.1 Physical properties of <i>Acacia mangium</i>	16
	2.3.2 Chemical properties of <i>Acacia mangium</i>	17
	2.3.3 Mechanical properties of <i>Acacia mangium</i>	18
	2.3.4 Utilization of <i>Acacia mangium</i>	18
2.4	Oil Palm Biomass	19
2.5	Oil palm trunk	20
	2.5.1 Chemical properties of OPT	21
	2.5.2 Mechanical properties of OPT	22
	2.5.3 Utilization of OPT	23
2.6	Urea Formaldehyde	24
2.7	Factors affecting board properties	26
	2.7.1 Resin content	26
	2.7.2 Wood species	27
	2.7.3 Board density	28
	2.7.4 Particle size	29

CHAPTER 3 METHODOLOGY

3.1	Preparation of raw materials	30
3.2	Determination of moisture content (MC) and board density	37
3.3	Particleboard manufacturing	39
3.3.1	Board making process	40
3.3.2	Mixing	40
3.3.3	Mat forming	41
3.3.4	Pre press	42
3.3.5	Hot press	42
3.3.6	Board cutting/Trimming	44
3.4	Preparation of sample	44
3.5	Testing method	45
3.5.1	Determination of flexural strength (MOE/MOR)	46
3.5.2	Determination of Internal Bonding (IB)	49
3.5.2	Thickness swelling (TS)	51

CHAPTER 4 RESULTS AND DISCUSSION

4.1	Introduction	54
4.1.1	Particle analysis	54
4.1.2	Bulk density	55
4.2	Physical and mechanical properties of particleboard from <i>Acacia mangium</i> , OPT and admixture materials	56
4.3	Statistical significance of ANOVA	58
4.4	Effects of resin content on board properties	59
4.5	Effects of materials on board properties	65

CHAPTER 5 CONCLUSION AND RECOMMENDATIONS

CITED REFERENCES	77
APPENDICES	83
<i>CURRICULUM VITAE</i>	95

ABSTRACT

PROPERTIES OF PARTICLEBOARD MADE FROM ACACIA MANGIUM AND OIL PALM TRUNK IN RELATION TO DIFFERENT RESIN CONTENT

The study is carried out to determine the properties of hybrid particleboard made from *Acacia mangium* and oil palm trunk as influenced by different resin content. The homogeneous layer of hybrid particleboard made by *Acacia mangium* and oil palm trunk were fabricated with three different ratio of resin content; 7%, 9% and 11% with the constant particle size of 1.0mm for both *Acacia mangium* and oil palm trunk. Urea formaldehyde (UF) is used as a binder with an addition of ammonium chloride hardener. The target board density is 600 kg/m³. The properties of bending strength, internal bonding (IB) and thickness swelling (TS) are evaluated based on Malaysian standard (MS 1036:2006). The findings of this research were done according to the factors that can highly affect the board properties which include different resin content and materials used. From the research, the higher resin content which is 11% provides better board properties compared to particleboard with 7% resin content. Not only that, board manufactured from admixture materials also shows great properties similar with board from oil palm trunk.