

PERFORMANCE OF DOWELS IN FURNITURE JOINT

NURUL AIN BT ABU HASSAN

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

NOVEMBER 2008

ACKNOWLEDGEMENTS

Upon completion of this project, I would like to express my gratitude to many parties. My heartfelt goes to Prof Madya Said Ahmad, my advisor for this project, for his advice and guide during completion of this project including my friends for moral support. Also thanks to both my parents for their kindness as giving me support either by material or moral support, hope God bless them .Thank you so much to FRIM staff for their willingness and experience sharing in effort to help this project working successful especially Mr. Ahmad Ismail, Mr. Ong, Mr. Yaacob and Mr. Saimin for moral support that was given. Not forget to other lecturer that willing to supervise as Madam Judith Gisip (Project Thesis Coordinator), Prof. Abdul Razak Kader and all company that participate in my project completion.

Nurul Ain Bt Abu Hassan

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vi
LIST OF FIGURES	vii
LIST OF ABBREVIATIONS	ix
ABSTRACT	xi
ABSTRAK	xi
CHAPTER 1: INTRODUCTION	
1.1 Background	1
1.2 Problem statement	2
1.3 Significant of study	3
1.4 Justification	3
1.5 Objectives of study	4
CHAPTER 2: LITERATURE REVIEW	
2.1 Introduction	5
2.1.1 Dowel joints	5
2.1.2 Importance of joint	6
2.2 Dowel Performance based on Certain Criteria	7
2.2.1 Effect of Gluing Condition	7
2.2.2 Effect of Tightness of Fit	8
2.2.3 Effect of Dowel Surface	9
2.2.4 Moisture Content of Dowel	9
2.2.4.1 Density	10
2.2.5 Type of Dowel	10
2.2.6 Dowel Embedment Strength	10
2.2.6.1 Dowel Depth of Penetration Strength	11
2.2.7 Strength of dowel joint based on Grain Orientation	12
2.2.7.1 Effect of Wood Properties to Strength of joint	13
2.2.7.2 Mechanical properties of wood	13
2.2.8 Diameter and Length of Dowel effect to the Strength of Joint	14
2.3 Criteria of wood substrate selection	15
2.3.1 Wood substrate	15

2.3.2	Wood working properties	17
2.3.3	Gluing properties	17
2.3.4	Strength group	17
2.4	Quality Control Procedures for the Production of Joints	17
2.4.1	T-type jointing	18
2.5	Test Method	19
2.5.1	Pull-through Test	19

CHAPTER 3: METHODOLOGY

3.0	Introduction	21
3.1	Preparation of materials	22
3.2	Preparation of experimental materials	24
3.2.1	Boring hole	26
3.2.2	Gluing	28
3.2.3	Wax paper	28
3.3	Assembly process of test sample	29
3.4	Testing method	30
3.4.1	Pulling test	31
3.5	Recording data	34

CHAPTER 4: RESULTS AND DISCUSSION

4.1	End to side grain test	35
4.1.1	Comparison between species for 10 mm depth of embedment	36
4.1.2	Comparison of species strength based on 20 mm depth of embedment	37
4.1.3	Comparison of species strength based on 30 mm depth of embedment	39
4.1.4	Comparison of depth strength within ramin species	41
4.1.5	Comparison of depth strength within rubberwood species	43
4.1.6	Comparison of depth strength within dark red meranti species	44
4.2	Discussion	47
4.3	Factor failure	50

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

CITED REFERENCES

APPENDICES

CURRICULUM VITAE

ABSTRACT

PERFORMANCE OF DOWELS IN FURNITURE JOINT

Jointing performance important to ensure produce joint with sufficient strength. In order to have good joint, jointing condition very important to give consideration. In this study, dowel joint performance was evaluated. Only one testing use which is pulling test. Result had compiled and analyse using ANOVA. Result was shown that between three type comparison of species such ramin(*Gonystylus spp.*), rubberwood (*Hevea Brasiliensis*) and dark red meranti(*Shorea spp.*) Rubberwood gave significant value throughout ANOVA analysis. Rubberwood has straight groove profile. For comparison between ramin and dark red meranti species, dark red meranti perform better than ramin but through ANOVA analysis there is no significant different between both species. For depth of embedment effect on strength, 20 mm depth was highest in strength compare to 10 and 30 mm depth of embedment.