

**PREFABRICATED WOOD I-JOIST FROM LAMINATED VENEER  
LUMBER (LVL) FLANGE AND LVL PARALLEL WEB**

By

**Mariani Binti Mamat**

**Final Project Submitted in Partial Fulfillment for the  
Diploma in Wood Industries, Faculty of Applied Science,  
Universiti Teknologi MARA**

**September 2002**

## ACKNOWLEDGEMENTS

Firstly I would like to show my gratefulness towards ALLAH S.W.T The Merciful for giving me such a tremendous moment with determinations and courage upon the period of time finishing this project paper.

Besides that, I am pleased to express my great accomplishment to Encik Wan Mohd Nazri bin Wan Abdul Rahman as the advisor also as the final project lecturer (WTE 315), with his comments and suggestions which had expanded the valuable information during the preparation of this paper.

At this moment, also I wanted to convey my gratefulness to Assoc. Prof. Dr. Jamaludin Kasim, the Head of Program Diploma Industri Perkayuan. Lastly but not least, not forget to all individuals who are involved either directly or indirectly during the hard times towards the success of this final project paper.

## TABLE OF CONTENTS

Page

<b>APPROVAL SHEET</b> .....	<b>ii</b>
<b>DEDICATION</b> .....	<b>iii</b>
<b>ACKNOWLEDGEMENTS</b> .....	<b>vi</b>
<b>LIST OF TABLES</b> .....	<b>vii</b>
<b>LIST OF FIGURES</b> .....	<b>viii</b>
<b>LIST OF PLATES</b> .....	<b>ix</b>
<b>ABSTRACT</b> .....	<b>x</b>
<b>ABSTRAK</b> .....	<b>xi</b>

### CHAPTER

<b>I</b>	<b>INTRODUCTION</b> .....	<b>1</b>
	1.1 Problem Statement.....	2
	1.2 Objective.....	2
<b>II</b>	<b>LITERATURE REVIEW</b> .....	<b>3</b>
	2.1 Prefabricated Wood I-Joist.....	3
	2.2 Components of I-Joist System.....	7
	2.2.1 Laminated Veneer Lumber (LVL).....	8
	2.3 The Used of I-Joist.....	10
	2.3.1 Why Use Prefabricated Wood I-Joist.....	11
	2.4 Geometry, Stress and Strain .....	12
	2.5 Defect during Testing.....	13
<b>III</b>	<b>MATERIALS AND METHODS</b> .....	<b>14</b>
	3.1 Factorial Experiment.....	14
	3.2 Cross-Section of I-Joists.....	15
	3.3 Preparation of I-Joists.....	16
	3.3.1 Flange .....	17
	3.3.2 Type of Glue.....	18
	3.4 I-Joist Fabrication.....	19
	3.5 Failure during Test.....	21
	3.6 Destructive Testing of I-Joist Samples.....	21
	3.7 Calculation of Moment of Inertia (I) for I-Joist.....	23
	3.8 Section Modulus (Z).....	27
	3.9 Calculation of MOE and MOR of I-Joist.....	28

## CHAPTER I

### INTRODUCTION

Malaysia is one of the tropical countries with 61% or 20.1 million hectare of the total land area of green cover. It included about 6.2 million hectare are found in peninsular Malaysia, 9.4 million hectare in Sarawak and 4.5 million hectare in Sabah. Recently, the concern about tropical timber especially on common timber tree have grown faster than the other species especially Rubberwood (*Hevea brasiliensis*), which is the major wood base industry. Rubberwood is a tropical tree and is the principal source of rubber and now, many value products from rubberwood has been produce. The properties such as furniture, glulam, plywood, laminated veneer lumber (LVL) and other wood based panel.

Usually, wood I-joists were made with solid sawn lumber flanges and plywood web. This was follow by I-joists produced from wood products, as if LVL has been use for flanges and plywood for web materials.

The advantage of an I-shapes compared to the solid section is higher bending moments and stiffness can be achieved with the minimum use of the material (Breyer, 1993). Moreover, the results of using I-joist make more environmentally friendly building products with a view of flange profile requiring fewer natural resources (Anon, 1998).

### **1.1 Problem Statement**

The use of solid timber for structural purposes may not last for long during the limited natural resources. The changes from solid wood-to-wood composite that is available in wherever. The properties of wood composite such as laminated veneer lumber (LVL), plywood, oriented strength board (OSB) will be reduce the used of natural resources.

### **1.2 Objective**

The main objective of the study was to determine the strength properties of wood I-joist made from flanges and web materials with LVL used Rubberwood (*Hevea brasiliensis*)