

**MECHANICAL FASTENERS AND CONNECTORS  
USE IN TIMBER CONSTRUCTIONS**

By

**MASIDAH BINTI MOHAMED SHAMSI**

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

**September 2001**

## ACKNOWLEDGEMENTS

First, I would like to take this opportunity to show my thankfulness towards Allah S.W.T. the most merciful, for giving me strength and ability upon the completion of this final project.

My biggest vote of thanks due to my advisor Prof. Madya Abd. Jalil Ahmad for his encouragement, advices, comments and suggestions.

Lastly, to my colleagues that have been given me a lot of support and inspirations in completing this final project.

# TABLE OF CONTENTS

|   | <b>Page</b> |
|---|-------------|
| <b>APPROVAL SHEET</b> .....               | <b>ii</b>   |
| <b>DEDICATION</b> .....                   | <b>iii</b>  |
| <b>ACKNOWLEDGEMENTS</b> .....             | <b>iv</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>LIST OF ABBREVIATIONS</b> .....        | <b>x</b>    |
| <b>ABSTRACT</b> .....                     | <b>xi</b>   |
| <b>ABSTRAK</b> .....                      | <b>xii</b>  |
| <br><b>CHAPTER</b>                        |             |
| <b>1 INTRODUCTION</b> .....               | <b>1</b>    |
| <br><b>2 MECHANICAL FASTENERS</b> .....   | <b>2</b>    |
| 2.1 Nails.....                            | 2           |
| 2.1.1 Introduction.....                   | 2           |
| 2.1.2 Nail sizes.....                     | 2           |
| 2.1.3 Types of nails.....                 | 4           |
| 2.1.4 Strength of nailed connections..... | 6           |
| 2.2 Screws.....                           | 9           |
| 2.2.1 Introduction.....                   | 9           |
| 2.2.2 Wood screw types.....               | 10          |
| 2.2.3 Wood screw sizes.....               | 11          |
| 2.2.4 Strength of connection.....         | 12          |
| 2.3 Bolts and Nuts.....                   | 12          |
| 2.3.1 Introduction.....                   | 12          |
| 2.3.2 Types of loading.....               | 12          |
| 2.3.3 Types of joint.....                 | 13          |
| 2.3.4 Strength of connection.....         | 14          |
| 2.4 Lag bolts (lag screws).....           | 15          |
| 2.4.1 Introduction.....                   | 15          |
| 2.4.2 Sizes.....                          | 15          |
| 2.4.3 Direction of loading.....           | 18          |
| <br><b>3 TIMBER CONNECTORS</b> .....      | <b>19</b>   |
| 3.1 Shear plates.....                     | 19          |
| 3.1.1 Introduction.....                   | 19          |

|       |   |    |
|-------|---|----|
| 3.1.2 | Types and sizes of shear plate.....                     | 20 |
| 3.2   | Split rings.....  | 23 |
| 3.2.1 | Introduction.....                                       | 23 |
| 3.2.2 | Strength of the connection.....                         | 24 |
| <br>  |   |    |
| 4     | <b>USE OF MECHANICAL FASTENERS AND CONNECTORS</b> ..... | 26 |
| 4.1   | Furniture construction.....                             | 26 |
| 4.2   | Heavy timber constructions.....                         | 27 |
| <br>  |   |    |
| 5     | <b>CONCLUSIONS</b> .....                                | 32 |
| <br>  |   |    |
|       | <b>REFERENCES</b> .....                                 | 33 |
| <br>  |   |    |
|       | <b>APPENDIX</b> .....                                   | 34 |
| <br>  |   |    |
|       | <b>VITA</b> .....                                       | 36 |

## **ABSTRACT**

### **MECHANICAL FASTENERS AND CONNECTORS USE IN TIMBER CONSTRUCTIONS**

By

**MASIDAH BINTI MOHAMED SHAMSI**

**September 2001**

Mechanical fasteners and connectors are available for use in attaching one structural unit to another. Nails are generally used when loads are light. Whenever, lag screws, bolts and nut, and timber connectors are used loads are relatively large magnitude need to be transmitted through a joint. Split rings and shear plates are suitable for joints in heavy timber construction. They are two types of loading can be utilized that is perpendicular loading and parallel loading. Also, they are a number of factors that affected the strength to the wood connection.