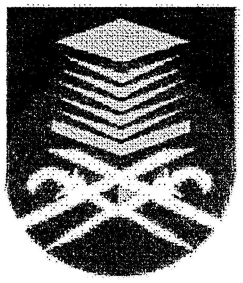

ANALYSIS OF LIGHTWEIGHT BOX STRUCTURE

WAN NOR AZAM BIN MOHAMAD

(99384659)

A thesis submitted in partial fulfillment of the requirements for the award

Of Bachelor Engineering (Hons) (Mechanical)

Faculty Mechanical Engineering

Universiti Teknologi MARA (UiTM)

MARCH 2002

ACKNOWLEDGEMENT

By the name of Allah s.w.t, the most gracious and merciful. We praise Him and we seek His noble Prophet Rasullulah s.w.t. Million of grateful to Allah s.w.t because enable us to complete this final project in time and graduated in Bachelor in Mechanical Engineering.

Here we would like to express our thanks to our project advisor, Dr Wahyu Kuntjoro for this guidance and assistance from beginning to final stage, in completing this final project. Also thanks to UiTM Mechanical Engineering Faculty staffs especially to Mr. Abu Kassim who sacrificed his time in giving us information and help whenever we need them for our project.

We also would like to thanks to the project examiners for their time, questions rise and suggestions during project presentation. They are Prof. Dr. Ahmad Suhaimi and Cik Faridah.

finally we want to express our thank to all lecturers of faculty of Mechanical Engineering, , for their support and assistance, and make this project complete.

"MAY ALLAH S.W.T BLESS YOU ALL"

ABSTRACT

The objective of this project is to examine the behavior of lightweight box structure loaded by given external force. The analysis involves stress, strain and the displacement. There are two methods that have been used to analyze this structure, theoretical analysis and followed by experiment. The experimental result and the theoretical result will be compared. The experimental method used the strain gauge and data logger to obtain the stress occurs. The strain gauges are distributed at several points. The deflection is measured using the dial indicator. The comparison is made based on the result of these two methods. We identify that the theoretical method and experiment show close result.

TABLE OF CONTENTS

CONTENTS		PAGE
PAGE TITLE		i
ACKNOLEDGEMENT		ii
ABSTRACT		iii
TABLE OF CONTENTS		iv
LIST OF TABLE S		vii
LIST OF FIGURES		viii
LIST OF ABBREVIATIONS		x
CHAPTER I	**INTRODUCTION**	
1.0	General	1
1.1	Objective	2
1.2	Methodology	2
1.3	Report overview	4
CHAPTER II	**THEORY OF STRESS AND DEFLECTION**	
2.0	Introduction	6

2.1	Stress		7
2.2	Determination of deflection by use of the bending moment diagram		11
2.3	Finding shear strain from triaxial strain measurer (Rosette strain gauge)		14
2.4	Stress and strain relationship		16

CHAPTER III FABRICATION

3.0	Introduction		18
3.1	Material		18
3.2	Geometry		19
3.3	Manufacturing process		19
	3.3.1	Fabrication specimen for tensile test	19
	3.3.2	Fabrication the box structure	21
	3.3.3	Fabrication the support	25

CHAPTER IV THEORETICAL ANALYSIS STRUCTURE

4.0	Theoretical approach		28
4.1	Sample calculation to determine the second Moment of area at each section (section 1)		29
4.2	Bending moment calculation		32

CHAPTER V STRAIN GAUGE INSTALLATION

5.0	Introduction		34
5.1	Preparation and install strain gauge		34