

**EXPERIMENTAL STUDY ON THE CRUSH BEHAVIOR OF
THIN-WALLED GROOVED TUBES**

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**Final Year Project Report Submitted in
Partial Fulfillment of the Requirement for the
Degree of Bachelor of Sciences (Hons.) Industrial Physics
in the Faculty of Applied Sciences
Universiti Teknologi MARA**

JANUARY 2013

ACKNOWLEDGEMENTS

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Alhamdulillah,

Thank to God is ALLAH S.W.T, finally this thesis is accomplished.

I would like to express my gratitude to my helpful supervisor, Puan Syafawati Nadiah Binti Mohamed, who has guide and support me in giving advice to improve my final year project. Without her, this thesis cannot be completed and finished successfully.

My appreciation also goes to Encik Hafizi Bin Lukman, co-supervisor at Faculty Mechanical Engineering for his help and guidance in overcoming my problems. To those who have contributed their cooperation and assisted me, such as the staff and seniors at Mechanical Engineering Laboratory UiTM Shah Alam, thank you very much for all your helps.

Also not forgetting to my family, thanks for all your supports and sacrifices.

Last but not least, I really appreciate for my entire friends who support me with motivation. Thank you for everything.

Wassalam

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TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	i
TABLE OF CONTENTS	ii
LIST OF TABLES	iv
LIST OF FIGURES	v
ABSTRACT	vii
CHAPTER 1 INTRODUCTION	
1.1 Background of study	1
1.2 Problem statement	4
1.3 Objectives of study	5
1.4 Significance of study	6
1.5 Scope of study	6
CHAPTER 2 LITERATURE REVIEW	
2.1 Energy absorption	7
2.2 Types of thin walled	9
2.2.1 Circular metal thin walled	11
2.2.2 Rectangular metal thin walled	13
2.3 Properties of aluminum	15
2.4 Modification of thin walled design	17
2.4.1 Grooves	18
2.5 Load-displacement curve	20
2.6 Specific energy absorption	22
2.7 Crush force efficiency	23
CHAPTER 3 METHODOLOGY	
3.1 Introduction	24
3.2 Collects information and literature review	27
3.3 Material selection and preparation	27
3.4 Experimental work	29
CHAPTER 4 RESULT AND DISCUSSION	
4.1 Introduction	31
4.2 Compression test of plain circular tubes	31
4.3 Effect of grooves to thin walled circular tubes	35
4.4 Initial peak force	40
4.5 The load-displacement curve	44
4.6 Increased the width of grooves	45

ABSTRACT

Thin-walled structures with different shapes are widely used in transportation systems as energy absorbing component to dissipate the kinetic energy during collision. In the present study, crashworthiness characteristic of thin-walled grooves aluminum tubes are studied. The aim is to protect this structure from serious damages as well as to minimize the injury to people during collision in transportation systems. Quasi-static axial crushing was performed to determine initial peak force (IPF), load-displacement curve, crush force efficiency (CFE) and specific energy absorption (SEA) of the tubes. The experimental results determine behavior of circular tubes in crushing manner, load displacement curves and initial crushing load were reduced as the slots is installed. This assists to reduce the extremely high initial peak force and improve the crushing efficiency of the structure.

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Today, various transportation tools play a large role in society both domestically and internationally in Malaysia. The number of vehicles running on the roads, ships sailing on the water and aircraft flying in the sky is rapidly increasing. Not only does technology contribute to the increasing quantity of vehicles, it also allows for properties such as greater speed and larger mass in vehicles such as trucks and aircrafts (Lu et al. and Yu et al., 2003). These vehicles cause more serious damage to people and the environment when they are involved in accidents (Figure 1.1). A crash involving rapidly moving vehicles occurring in an instant will result in a large impact force, causing a huge acceleration to the structures and occupants of the vehicles. This impact acceleration pulse is loaded and unloaded in a very short duration at a high speed.