UNIVERSITI TEKNIKAL MALAYSIA MELAKA

NOISE INSULATOR FROM NATURAL FIBER COMPOSITE

This report submitted in accordance with requirements of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering (Engineering Material) with Honours.

by

MOHD NOOR IKHWAN BIN MOHD FAUZI

FACULTY OF MANUFACTURING ENGINEERING

2009

© Universiti Teknikal Malaysia Melaka

UNIVERSITI TEKNIKAL MALAYSIA MELAKA (UTeM)

BORANG PENGESAHAN STATUS LAPORAN PSM

JUDUL: **NOISE INSULATOR FROM NATURAL FIBER COMPOSITE**

SESI PENGAJIAN: **2 - 2008/2009**

Saya **MOHD NOOR IKHWAN BIN MOHD FAUZI**

mengaku membenarkan laporan PSM/tesis (Sarjana/Doktor Falsafah) ini disimpan di Perpustakaan Universiti Teknikal Malaysia Melaka (UTeM) dengan syarat-syarat kegunaan seperti berikut:

1. Laporan PSM/tesis adalah hak milik Universiti Teknikal Malaysia Melaka dan penulis.
2. Perpustakaan Universiti Teknikal Malaysia Melaka dibenarkan membuat salinan untuk tujuan pengajian sahaja dengan izin penulis.
3. Perpustakaan dibenarkan membuat salinan laporan PSM/tesis ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. *Sila tandakan (√)

☐	SULIT	(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia yang termaktub di dalam AKTA RAHSIA RASMI 1972)
☑	TERHAD	(Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)
☐	TIDAK TERHAD	

(TANDATANGAN PENULIS)

Alamat Tetap:
LOT 2798,
KG BUKIT CINA,
22000 JERTEH,
TERENGGANU DARUL IMAN

Tarikh: 22 MAY 2009

(TANDATANGAN PENYELIA)

Cop Rasmi:

MOHD YUHAZRI BIN YAAKOB
Pensyarah
Fakulti Kejuruteraan Pembuatan
Universiti Teknikal Malaysia Melaka

Tarikh: 22 MAY 2009

* Jika laporan PSM ini SULIT atau TERHAD, sila lampirkan surat daripada pihak organisasi berkenaan dengan menyatakan sekali sebab dan tempoh tesis ini perlu dikelaskan sebagai SULIT atau TERHAD.

© Universiti Teknikal Malaysia Melaka

UNIVERSITI TEKNIKAL MALAYSIA MELAKA
Karung Berkunci 1200, Ayer Keroh, 75450 Melaka
Tel : 06-233 2421, Faks : 06 233 2414
Email : fkp@kutkm.edu.my

FAKULTI KEJURUTERAAN PEMBUATAN

Rujukan Kami (Our Ref) :
Rujukan Tuan (Your Ref):

13 Mei 2009

Pustakawan
Perpustakaan Universiti Teknikal Malaysia Melaka (UTeM)
Taman Tasik Utama, Hang Tuah Jaya,
Ayer Keroh, 75450, Melaka

Saudara,

PENGKELASAN LAPORAN PSM SEBAGAI SULIT/TERHAD
- LAPORAN PSM SARJANA MUDA KEJURUTERAAN PEMBUATAN (BAHAN KEJURUTERAAN): MOHD NOOR IKHWAN BIN MOHD FAUZI
TAJUK: NOISE INSULATOR FROM NATURAL FIBER COMPOSITE

Sukacita dimaklumkan bahawa tesis yang tersebut di atas bertajuk **"NOISE INSULATOR FROM NATURAL FIBER COMPOSITE"** mohon dikelaskan sebagai terhad untuk tempoh lima (5) tahun dari tarikh surat ini memandangkan ia mempunyai nilai dan potensi untuk dikomersialkan di masa hadapan.

Sekian dimaklumkan. Terima kasih.

"BERKHIDMAT UNTUK NEGARA KERANA ALLAH"

Yang benar,

.....

MOHD YUHAZRI BIN YAAKOB
Penyarah,
Fakulti Kejuruteraan Pembuatan
Universiti Teknikal Malaysia Melaka(UTeM)
Karung berkunci 1200, Ayer Keroh,
75450, Melaka

© Universiti Teknikal Malaysia Melaka

DECLARATION

I hereby, declared this report entitled **"NOISE INSULATOR FROM NATURAL FIBER COMPOSITE"** is the result of my own research except as cited in the references.

Signature	:	……
Author's Name	:	Mohd Noor Ikhwan B Mohd Fauzi
Date	:	22 MAY 2009

© Universiti Teknikal Malaysia Melaka

APPROVAL

This report is submitted to the Faculty of Manufacturing Engineering of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Manufacturing Engineering (Engineering Material). The members of the supervisory committee are as follow:

……..

Mohd Yuhazri Bin Yaakob

(Principal Supervisor)

© Universiti Teknikal Malaysia Melaka

ABSTRACT

Due to high interest in high quality but low cost material, lots of researches have been done by the researcher and engineers. Together with the increasing usage of composite material from mixture of natural materials nowadays, this technical report will proposed a research titled '*Noise Insulator from Natural Fiber Composite'*. Coconut fiber and natural rubber is the material selected for this research as it offer lots of advantage which it has high quality as well as easy to found especially in Malaysia. This mixture of coconut fiber and natural rubber is mixed together in cold press process in a mold to fabricate the composite with different composition of natural rubber by increasing 5 percent of weight for each sample which is start from 0 percent up until 60 percent of natural rubber respectively. Mold of ten millimeters in thickness is prepared as the mold of the specimen preparation. A actual specimen will be as comparison to the specimens with natural rubber for its mechanical properties. These four specimens will then be tested with Tensile Test, Compression test, Moisture Absorption Test and Noise absorption Test to make assessment. From the results obtained, the best specimen will be chosen for Noise Insulator application.

© Universiti Teknikal Malaysia Melaka

ABSTRAK

Seiring dengan permintaan yang tinggi untuk bahan yang berkualiti dan berkos rendah, banyak kajian telah di lakukan oleh para pengkaji dan jurutera. Sejajar dengan penggunaan bahan komposit daripada campuran bahan semula jadi yang semakin meluas masa ini, laporan teknikal ini membentangkan hasil kajian yang bertajuk *Noise Insulator from Natural Fibers Composite.* Sabut kelapa dan getah asli semula jadi adalah bahan mentah yang digunakan dalam kajian ini. Campuran sabut kelapa dengan getah asli semula jadi dihasilkan menerusi proses mampatan menggunakan kaedah mampatan acuan untuk mengfabrikasi komposit dengan kadar kenaikan 5% bg setiap sampel bermula 0% kandungan getah asli semula jadi hingga 60% kandungan getah asli semulajadi di dalam setiap sampel plat acuan setebal 10mm disediakan sebagai acuan untuk penyediaan sampel. Sampel sabut kelapa sepenuhnya juga difabrikasi untuk tujuan perbandingan sifat mekanik nya dengan sabut kelapa yang diisi dengan getah asli semula jadi. Keempat-empat sampel ini akan diuji dengan ujian tegangan, ujian mampatan, ujian penyerapan kelembapan dan ujian bunyi bagi setiap sampel untuk dibuat penilaian. Daripada keputusan yang diperolehi, hasil yang terbaik akan dijadikan produk yang sesuai untuk perendam atau penebat bunyi.

© Universiti Teknikal Malaysia Melaka

DEDICATION

Special gift to my family especially to my beloved parents, Abah, Mohd Fauzi Bin Abdul Razak and Ma, Gayah Bte Sulaiman, to my supportive brothers and sisters, to my supervisors, thanks for the priceless knowledge you provided to me and also to all my friends. May Allah S.W.T bless all of you.

© Universiti Teknikal Malaysia Melaka

ACKNOWLEDGEMENT

In the name of ALLAH, Most Gracious, Most Merciful.
Dengan Nama ALLAH yang Maha Pemurah, Lagi Mengasihani.

I would like to express my appreciation to the individuals who had played a part in ensuring a successful occurrence and flow of activities throughout the duration of my final year project. Endless appreciation and gratitude to my supervisor, Mohd Yuhazri Bin Yaakob for the encouragement and support and spending quite time with myself, providing a lot of guidance and ideas for my project research. Their knowledge and experience really inspired and spurred myself. I truly relished the opportunity given working with them. Last but not lease, my appreciation to all technicians involved to complete this project especially to polymer and material lab in UTeM. Finally, my sincere appreciation is dedicated to my family especially Abah and Ma for prayer, harmful support and all the guidance to make sure I stand as like as nowdays. Not forgotten, as well as all friends for their priceless assistance and patronage throughout the process of data gathering and also the idea's regarding this project. Thank you all of you.

© Universiti Teknikal Malaysia Melaka

TABLE OF CONTENT

Declaration			ii
Approval			iii
Abstract			iv
Abstrak			v
Dedication			vi
Acknowledgements			vii
Table of Contents			viii
List of Tables			ix
List of Figures			xi
List of Abbreviations			xiv
List of Symbols			xv
1	**INTRODUCTION**		**1**
	1.1	Project Background	1
	1.2	Problem Statement	3
	1.3	Objective	3
	1.4	Scope	3
	1.5	Rational of The Research	4
2	**LITERATURE REVIEW**		**5**
	2.1	Sound	5
		2.1.1 Sound production and propagation	5
		2.1.2 Noise	7
		2.1.3 Noise Reduction or Noise prevention	10
		2.1.4 Reflection, Dispersion, Absorption, Refraction of Sound	13
		2.1.5 Wave Character	14
	2.2	Coconut Fiber	16

© Universiti Teknikal Malaysia Melaka

2.2.1 Coconut Fiber Description 17
2.2.2 Physical Properties of Coconut Fiber 20
2.2.3 Natural Humidity, Specific Weight and Water Absorption 21
2.2.4 Water Absorption Of Natural Fiber 22
2.2.5 Mechanical Properties of Natural Fiber 24
2.3 Composite 26
2.3.1 Definition of The Composite 26
2.4 Rubber 29
2.4.1 Natural Latex 29
2.4.2 Synthetic Rubber 30

3 METHODOLOGY 32
3.1 Introduction 32
3.2 Materials Selection and Preparation 33
3.2.1 Coconut Fiber 34
3.2.2 Natural Latex 36
3.3 Composite Fabrication 37
3.3.1 Procedure Of Cold Compress 43
3.4 Mechanical Testing and Analysis 44
3.4.1 Tensile Testing 45
3.4.1.1 Procedure 46
3.4.2 Compression Testing 49
3.5 Physical Testing 51
3.5.1 Moisture Absorption Testing 51
3.5.1.1 Procedure 52
3.5.1.2 Calculation 52
3.5.2 Noise Absorption Testing 53
3.5.2.1 Procedure 54
3.5.2.2 Calculation 56

© Universiti Teknikal Malaysia Melaka

4 RESULT AND DISCUSSION 58

4.1 Tensile Test Analysis 58

4.1.1 Tensile Result for 0 wt. % of Latex 60

4.1.2 Tensile Result for 5 wt. % of Latex 61

4.1.3 Tensile Result for 10 wt. % of Latex 62

4.1.4 Tensile Result for 15 wt. % of Latex 64

4.1.5 Tensile Result for 20 wt. % of Latex 65

4.1.6 Tensile Result for 25 wt. % of Latex 66

4.1.7 Tensile Result for 30 wt. % of Latex 68

4.1.8 Tensile Result for 35 wt. % of Latex 69

4.1.9 Tensile Result for 40 wt. % of Latex 71

4.1.10 Tensile Result for 45 wt. % of Latex 72

4.1.11 Tensile Result for 50 wt. % of Latex 73

4.1.12 Tensile Result for 55 wt. % of Latex 75

4.1.13 Tensile Result for 60 wt. % of Latex 76

4.1.14 Tensile Result for Actual Product 77

4.1.15 Tensile Test Analysis Conclusion 79

4.2 Compression Test Analysis 82

4.2.1 Compression Result for 0 wt. % of latex 83

4.2.2 Compression Result for 5 wt. % of latex 84

4.2.3 Compression Result for 10 wt. % of latex 85

4.2.4 Compression Result for 15 wt. % of latex 86

4.2.5 Compression Result for 20 wt. % of latex 87

4.2.6 Compression Result for 25 wt. % of latex 88

4.2.7 Compression Result for 30 wt. % of latex 89

4.2.8 Compression Result for 35 wt. % of latex 90

4.2.9 Compression Result for 40 wt. % of latex 91

4.2.10 Compression Result for 45 wt. % of latex 92

4.2.11 Compression Result for 50 wt. % of latex 94

4.2.12 Compression Result for 55 wt. % of latex 95

4.2.13 Compression Result for 60 wt. % of latex 96

© Universiti Teknikal Malaysia Melaka

4.2.14 Compression Result for Actual Product 97
4.2.15 Compression Test Analysis Conclusion 98
4.3 Moisture Absorption Test Analysis 100
4.3.1 Moisture Absorption Analysis Conclusion 107
4.4 Noise Absorption Test Analysis 107
4.4.1 Measurement of Noise Absorption and Coefficient of a Room 111
4.4.2 Noise Absorption Test Analysis Conclusion 117
4.5 Bill of Materials 117

5 CONCLUSION AND RECOMMENDATION 118
5.1 Conclusion 118
5.2 Recommendation 119
5.2.1 Future Research 119
5.2.2 Natural Fiber Composite Strength 119
5.2.3 Natural Fiber Composite Weakness 120

6 REFERENCES 122

7 APPENDICES 124

© Universiti Teknikal Malaysia Melaka

LIST OF TABLE

NO	TITLE	PAGES
2.1	Mechanical Characteristic of Sound Wave	6
2.2	Tensile Properties of Coconut Fiber	19
2.3	Sisal Production in Brazil Since 1985 (in tones)	19
2.4	Length and Diameter for Sisal and Coconut Fiber	20
2.5	Chemical Composition in Coconut Fiber	21
2.6	Natural Humidity and Specific Weight for Sisal and Coconut Fiber	22
2.7	Average Properties of Coconut Fiber	26
3.1	Tensile Specimen Geometry Recommendation	47
3.2	Compression Specimen Geometry Recommendation	49
4.1	Data Tensile for Five Specimen for 0 wt. % of Latex	60
4.2	Data Tensile for Five Specimen for 5 wt. % of Latex	61
4.3	Data Tensile for Five Specimen for 10 wt. % of Latex	62
4.4	Data Tensile for Five Specimen for 15 wt. % of Latex	64
4.5	Data Tensile for Five Specimen for 20 wt. % of Latex	65
4.6	Data Tensile for Five Specimen for 25 wt. % of Latex	66
4.7	Data Tensile for Five Specimen for 30 wt. % of Latex	68
4.8	Data Tensile for Five Specimen for 35 wt. % of Latex	69
4.9	Data Tensile for Five Specimen for 40 wt. % of Latex	71
4.10	Data Tensile for Five Specimen for 45 wt. % of Latex	72
4.11	Data Tensile for Five Specimen for 50 wt. % of Latex	73
4.12	Data Tensile for Five Specimen for 55 wt. % of Latex	75
4.13	Data Tensile for Five Specimen for 60 wt. % of Latex	76
4.14	Data Tensile for Five Specimen for Actual Product	77
4.15	Data Compression for Five Specimen for 0 wt. % of Latex	83
4.16	Data Compression for Five Specimen for 5 wt. % of Latex	84
4.17	Data Compression for Five Specimen for 10 wt. % of Latex	85

© Universiti Teknikal Malaysia Melaka

4.18	Data Compression for Five Specimen for 15 wt. % of Latex	86
4.19	Data Compression for Five Specimen for 20 wt. % of Latex	87
4.20	Data Compression for Five Specimen for 25 wt. % of Latex	88
4.21	Data Compression for Five Specimen for 30 wt. % of Latex	89
4.22	Data Compression for Five Specimen for 35 wt. % of Latex	90
4.23	Data Compression for Five Specimen for 40 wt. % of Latex	91
4.24	Data Compression for Five Specimen for 45 wt. % of Latex	92
4.25	Data Compression for Five Specimen for 50 wt. % of Latex	94
4.26	Data Compression for Five Specimen for 55 wt. % of Latex	95
4.27	Data Compression for Five Specimen for 60 wt. % of Latex	96
4.28	Data Compression for Five Specimen for Actual Product	97
4.29	Data for Initial Weight of Specimen for Moisture Test	102
4.30	Data after Sample Exposed to Moisture Absorption	103
4.31	Average Percentage of Moisture Absorption	104
4.32	Result for Noise Absorption Testing	110
5.1	Natural Fiber Composite Prices	117
5.2	Actual Product Prices	117
5.3	Natural Fiber Composite Price for All Specimen	118

© Universiti Teknikal Malaysia Melaka

LIST OF FIGURES

NO	TITLE	PAGES
2.1	Reflection of The Sound Wave	14
2.2	Reinforced From Single Wave Length	15
2.3	General Process To Get Coconut Fiber	16
2.4	Longitudinal Section of a Coconut	17
2.5	Interaction of Natural Reinforcement Fiber and Drying Soil	23
2.6	Water Absorption of Natural and Treated Sisal and Coconut Fiber	24
2.7	Tensile Strength and Strain of The Fiber With Time	25
3.1	Four Main Categorize Summarize under Methodology	32
3.2	Type of Materials Used in This Project	33
3.3	Coconut Fiber in Chopped Strand Mats	35
3.4	Natural Latex Form in Original Color	36
3.5	Example of Latex Based Product	37
3.6	Flow Process of The Composite Fabrication	38
3.7	Process Flow to Get Natural Fiber Composite	40
3.8	The Actual Size of The Sample	41
3.9	Hydraulic Cold Compress Machine	42
3.10	The Mould Used in Prepare Specimen	42
3.11	Process Flow for The Mechanical Testing	44
3.12	Sample Result for UTS	45
3.13	Universal Tensile Machine	46
3.14	Sample Dimension For The Tensile Test	47
3.15	Sample Position During Testing	48

© Universiti Teknikal Malaysia Melaka

3.16	Geometry of Compression Specimen	50
3.17	Process Flow For Physical Testing	51
3.18	Sample Test For Noise Absorption	54
3.19	Location For Sound Source	55
3.20	Location For Noise Level Meter	55
4.1	Example of Specimen Already Break	60
4.2	Tensile Graph for 0 wt. % of Latex	61
4.3	Tensile Graph for 5 wt. % of Latex	62
4.4	Tensile Graph for 10 wt. % of Latex	63
4.5	Tensile Graph for 15 wt. % of Latex	65
4.6	Tensile Graph for 20 wt. % of Latex	66
4.7	Tensile Graph for 25 wt. % of Latex	67
4.8	Tensile Graph for 30 wt. % of Latex	69
4.9	Tensile Graph for 35 wt. % of Latex	70
4.10	Tensile Graph for 40 wt. % of Latex	72
4.11	Tensile Graph for 45 wt. % of Latex	73
4.12	Tensile Graph for 50 wt. % of Latex	74
4.13	Tensile Graph for 55 wt. % of Latex	76
4.14	Tensile Graph for 60 wt. % of Latex	77
4.15	Tensile Graph for Actual Product	78
4.16	Average Value of Force for Tensile	79
4.17	Average Value of Young's Modulus for Tensile	80
4.18	Compression Graph for 0 wt. % of Latex	83
4.19	Compression Graph for 5 wt. % of Latex	84
4.20	Compression Graph for 10 wt. % of Latex	85
4.21	Compression Graph for 15 wt. % of Latex	86
4.22	Compression Graph for 20 wt. % of Latex	87
4.23	Compression Graph for 25 wt. % of Latex	88
4.24	Compression Graph for 30 wt. % of Latex	90
4.25	Compression Graph for 35 wt. % of Latex	91
4.26	Compression Graph for 40 wt. % of Latex	92
4.27	Compression Graph for 45 wt. % of Latex	93

© Universiti Teknikal Malaysia Melaka

4.28	Compression Graph for 50 wt. % of Latex	94
4.29	Compression Graph for 55 wt. % of Latex	95
4.30	Compression Graph for 60 wt. % of Latex	96
4.31	Compression Graph for Actual Product	97
4.32	Average Value of Young's Modulus for Compression	98
4.33	Average Value of Force for Compression	99
4.34	Average Percentage of Moisture Absorption	105
4.35	Average Percentage Vs No of Specimen	106
4.36	Average Value for Noise Level Reading	111
4.37	Sound Absorption for Each Specimen	114
4.38	Noise Coefficient for Each Specimen	115

© Universiti Teknikal Malaysia Melaka

LIST OF ABBREVIATIONS

Hz	-	Hertz
SI	-	International Systems of Units
kHz	-	Kilohertz
MHz	-	Megahertz
GHz	-	Gigahertz
THz	-	Terahertz
DUT	-	Device Under Test
RLC	-	Electrical Circuit
cm	-	Centimeter
s	-	Second
AC	-	Alternate Current
rms	-	Root Means Square
m	-	Meters
m/s	-	Meters per Second
m/s^2	-	Meters per Second Square
BA	-	Bahia
PB	-	Paraiba
UTeM	-	Universiti Teknikal Malaysia Melaka
UTM	-	Universal Tensile Machine

© Universiti Teknikal Malaysia Melaka

V	-	Volume
S-t	-	Strength Immersion Time
MPa	-	Mega Pascal
GPa	-	Giga Pascal
NBR	-	Nitrile Elastomers
RPDM	-	Ethylene Propylene Rubbers
Sdn.Bhd	-	Sendirian Berhad
RM	-	Ringgit Malaysia

LIST OF SYMBOLS

%	-	Percent
Pd	-	Air Dried
Σ	-	Stress
ε	-	Strain
E	-	Elasticity
Po	-	Oven Dried
γ	-	Specific Weight
Ftu	-	UTS, MPa
Pmax	-	Max Load Before Failure
σi	-	Tensile Stress at X data Point
Pi	-	Load at X data Point
A	-	Cross Sectional
εi	-	Tensile Strain at X data Point
δi	-	Extensometer Displacement at X data Point
Lg	-	Extensometer Gage Length
ωe	-	Experimentally Determined Deflaction
$(\varepsilon x + \varepsilon y)$	-	Experimentally Sum of The Strain

© Universiti Teknikal Malaysia Melaka

B	-	Bending Stiffness
S	-	Shear Stiffness
C	-	Core Thickness
F	-	Face Sheet Thickness
C1, C2	-	Constant Resulting From Navier Solution
Fcu	-	Ultimate Compression Strength
Pmax	-	Maximum Load Before Failure
$\sigma 1$	-	Compression Stress At X data Point
Pi	-	Load At X Data Point
A	-	Cross Sectional Area, mm2
Wi	-	Current Specimen Mass
Wb	-	Baseline Specimen Mass
α	-	Noise Coefficient

© Universiti Teknikal Malaysia Melaka

CHAPTER 1
INTRODUCTION

In this chapter, there are briefly discussed about the main body part of the thesis. In this chapter, it's focused about the Noise insulator from natural fiber composite. This chapter contain background, problem statement, objective, scope and rational of research.

1.1. Background

Noise pollution generally refers to unwanted sound produced by human activities unwanted in that it interferes with communication, work, rest, recreation, or sleep. Unlike other forms of pollution, such as air, water, and hazardous materials, noise does not remain long in the environment. However, while its effects are immediate in terms of disturbance, they are cumulative in terms of temporary or permanent hearing loss. Society has attempted to regulate noise since the early days of the Romans, who by decree prohibited the movement of chariots in the streets at night. In the United States, communities since colonial days have enacted ordinances against excessive noise, primarily in response to complaints from residents. It was not until the late 1960s, however, that the federal government officially recognized noise as a pollutant and began to support noise research and regulation. Federal laws against noise pollution included the National Environmental Policy Act of 1969, especially sections concerning environmental impact statements; the Noise Pollution and Abatement Act of 1970; and the Noise Control Act of 1972, which appointed the Environmental Protection Agency (EPA) to coordinate federal research and activities in noise control.

© Universiti Teknikal Malaysia Melaka

Noise intensity is measured in decibels units. The decibel scale is logarithmic; each 10 decibel increase represents a tenfold increase in noise intensity. Human perception of loudness also conforms to a logarithmic scale; a 10 decibel increase is perceived as roughly a doubling of loudness. Thus, 30 decibels is 10 times more intense than 20 decibels and sounds twice as loud; 40 decibels is 100 times more intense than 20 and sounds 4 times as loud; 80 decibels is 1 million times more intense than 20 and sounds 64 times as loud. Distance diminishes the effective decibel level reaching the ear. Thus, moderate auto traffic at a distance of 100 ft (30 m) rates about 50 decibels. To a driver with a car window open or a pedestrian on the sidewalk, the same traffic rates about 70 decibels; that is, it sounds 4 times louder. At a distance of 2,000 ft (600 m), the noise of a jet takeoff reaches about 110 decibels approximately the same as an automobile horn only 3 ft (1 m) away.

Subjected to 45 decibels of noise, the average person cannot sleep. At 120 decibels the ear registers pain, but hearing damage begins at a much lower level, about 85 decibels. The duration of the exposure is also important. There is evidence that among young Americans hearing sensitivity is decreasing year by year because of exposure to noise, including excessively amplified music. Apart from hearing loss, such noise can cause lack of sleep, irritability, heartburn, indigestion, ulcers, high blood pressure, and possibly heart disease. One burst of noise, as from a passing truck, is known to alter endocrine, neurological, and cardiovascular functions in many individuals; prolonged or frequent exposure to such noise tends to make the physiological disturbances chronic. In addition, noise-induced stress creates severe tension in daily living and contributes to mental illness.

Fiber reinforcement composite materials widely use in mainly industry such as air craft, space structures and robot arms because have high specific strength and damping ratio. Composite is a combination of two or more materials, for example, fiberglass and epoxy where fiberglass will act as reinforcement and while epoxy will act as matrix. Combination of materials should be more than 5 percent to be the composite. If the combination less than 5 percent, it’s called as impurities and not composite. Composite also present in interphase. The main function interphase is to

© Universiti Teknikal Malaysia Melaka

transfer the stress from matrix to fibers. Composite also have a different mechanical or physical properties if compare to the original materials (raw materials).

1.2 Problem Statement

Noise control is very important nowadays and not even limited to our daily life. The noise control is very important to in industry both small and medium or high technology industries. Noise can cause major problems and not only limited to the physical condition but it's also can affected mentally itself.

The purpose for this research is to produce new inventor insulator for reducing excessive noise. Noise insulator already used, but this research to design the noise insulator from natural fiber composite. Mostly insulator used the petroleum based to produce noise, vibration and heat insulator. This research will study the potential for the natural fiber composite.

1..3 Objectives

(a) To identify the mechanical and physical properties of natural fiber and natural rubber.

(b) To design and fabricate the noise insulator material from natural fiber composite.

1.4 Scope

(a) Study coconut as a reinforcement agent in natural fiber composite.
(b) Study natural latex as matrices in natural fiber composite.
(c) Study mechanical properties in natural fiber composite.
(d) Study the potential of natural fiber composite as a noise insulator.

© Universiti Teknikal Malaysia Melaka