UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DESIGN AND DEVELOP ROOFING MOULD USING RICE HUSK BIO COMPOSITE

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering (Manufacturing Design)

By

MUHAMMAD FARED BIN ROSLY

B050710064

FACULTY OF MANUFACTURING ENGINEERING

2011

APPENDIX D

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: DESIGN AND DEVELOP ROOFING MOULD USING RICE HUSK BIO COMPOSITE

SESI PENGAJIAN: 20010/11 Semester 2

Saya **MUHAMMAD FARED BIN ROSLY**

mengaku membenarkan Laporan PSM ini disimpan di Perpustakaan Universiti Teknikal Malaysia Melaka (UTeM) dengan syarat-syarat kegunaan seperti berikut:

1. Laporan PSM 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 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	

Disahkan oleh:

_____ _____

Alamat Tetap:
185 Keroh,
18000 Kuala Krai,
Kelantan.

Tarikh: 19/5/2011

PENYELIA PSM

Tarikh: _____

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

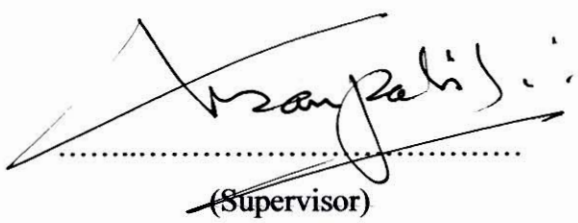
DECLARATION

I hereby, declared this report entitled "Design and Develop Roofing Mould Using Rice Husk Bio-Composite" is the results of my own research except as cited in references.

Signature	:	.....
Author's Name	:	Muhammad Fared Bin Rosly
Date	:	4 May 2011

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 (Manufacturing Design). The member of the supervisory committee is as follow:

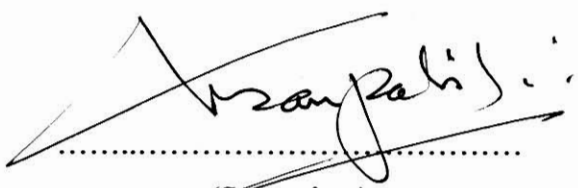


(Supervisor)

Professor Dr. Md. Dan Md. Palil
Faculty of Manufacturing Engineering
Universiti Teknikal Malaysia Melaka (UTeM)
Durian Tunggal, Melaka, Malaysia
H/P: +6012-273 2405, Email: drdan@utem.edu.my

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 (Manufacturing Design). The member of the supervisory committee is as follow:



(Supervisor)

Professor Dr. Md. Dan Md. Palil
Faculty of Manufacturing Engineering
Universiti Teknikal Malaysia Melaka (UTeM)
Durian Tunggal, Melaka, Malaysia
H/P: +6012-273 2405, Email: drdan@utem.edu.my

TABLE OF CONTENT

ABSTRAK

Cadangan menjadikan sekam padi sebagai bahan atap yang menggunakan bahan composite. Sekam padi adalah satu bahan terbuang yang dapat dimanfaatkan untuk dijadikan suatu bahan composite seperti bahan atap. Bahan composite yang digunakan adalah polyester resin, sekam padi dan hardener (MEKP). Bahan composite yang telah dibuat akan dijadikan atap menggunakan mold atap. Rekabentuk atap yang akan direka adalah berdasarkan kajian-kajian daripada rekabentuk-rekabentuk atap yang sedia ada. Atap akan dihasilkan dengan menggunakan mold yang direkabentuk. Bahan material yang dihasilkan akan diuji melalui sifat-sifat bahan tersebut. Ujian yang akan dilakukan ialah seperti kekuatan tarikan, elongasi, kekerasan dan kekuatan kesan akan dilakukan.

ABSTRACT

Proposed the alternative materials using rice husk composite for making the roof tiles. Polyester were used a matrix materials and the rice husk (natural fiber) as the reinforcement. The existing of roof tiles design will be studied in this project. The mold for roofing material will be designed and produced in this project. The roof tiles will be produced by using the roofing mold. The size of roof tiles will dependably on the designed mold while the material for the roof tiles is the rice husk composite material. The roof tiles materials that was produced will be tested and analyzed the on the material properties. The test of tensile strength, elongation, hardness and impact strength will be conducted.

ACKNOWLEDGEMENT

I would like to express my gratitude to all those who gave me the possibility to accomplish this project of manufacturing engineering bachelor's degree entitled Design And Develop Roofing Mould Using Rice Husk Bio-Composite. I have furthermore to thank the Management of Project Sarjana Muda, Sivarao a/l Subramanian, and Head of Department Manufacturing Design, Dr. Hambali Bin Arep who gave and confirmed this permission and supported me to progress my project. I am deeply indebted to my supervisor, Professor Dr. Md Dan Bin Md Palil from the Department of Manufacturing Design of UTeM whose help, stimulating suggestions, technical information, and encouragement helped me in all the time of project and writing of this report. My colleagues from 4BMFR of UTeM supported me in my research work. I want to thank them for all their help, support, interest and valuable hints.

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

RCA	-	Rice Husk Ash
PMC	-	Polymeric Matrix Composite
CAD	-	Computer Aided Design
HMD	-	Head Mounted Display
ROM	-	Rule Of Mixtures
UTS	-	Ultimate Tensile Strength
CRH	-	Chopped Rice Husk
UP	-	Unsaturated Polyester
RH	-	Rice Husk
UTM	-	Universal Testing Machine

CHAPTER 1
INTRODUCTION

Introduction

This Chapter will cover introductory of the project. This including the background of the project, the problem statement, Objectives, scope and report structure of the project.Those thing will explain the overview of the proposing the project.

1.1 Background

Rice milling industry generates a lot of rice husk during milling of paddy which comes from the fields. This rice husk is mostly used as a fuel in the boilers for processing of paddy. Rice husk is also used as a fuel for power generation. Rice husk ash (RHA) is about 25% by weight of rice husk when burnt in boilers. It is estimated that about 70 million tones of RHA is produced annually worldwide. This RHA is a great environment threat causing damage to the land and the surrounding area .

During milling of paddy about 78 % of weight is received as rice , broken rice and bran .Rest 22 % of the weight of paddy is received as husk . This husk is used as fuel in the rice mills to generate steam for the parboiling process . This husk contains about 75 % organic volatile matter and the balance 25 % of the weight of this husk is converted into ash during the firing process , is known as rice husk ash (RHA).

So for every 1000 kgs of paddy milled , about 220 kgs (22 %) of husk is produced , and when this husk is burnt in the boilers , about 55 kgs (25 %) of RHA is generated.

There is an idea in order to use the rice husk as a substance for roofing. The large option of materials used to roof a house, ranging from dried grass, to slate - pieces of stone. Modern products like plastic, fiberglass and concrete are available, and some innovative, energy-efficient homes are being roofed with sod. New products are being developed to overcome the shortcomings of older roofing materials, meet the demands of modern building techniques, and conform to increasingly stringent building codes. What most homeowner's wish is a roof that's not too expensive, requires no maintenance, and lasts forever. But most roofs are replaced or at least repaired every ten years. When the right material are been choose for roofing material, you can reduce the cost of replacement. In the long run, you'll use less building material, fill up less landfill space with unnecessary material, and put less demand on our natural resources.

The rice husks are wasted material that can be taking with good advantage by implementing and turn them into a products. The material can be turned into products such as roof tiles. The need of designing the mold for making the roof tiles using the rice husk material is necessary in order to get the shape of the roof tile. There are many types of molds that is expendable molds, permanent molds and composite molds. Permanent molds are going to be designed as it can be made of metal and is can maintain the high level of temperatures. As the name implies, they are used repeatedly and are designed in such a way that the casting can be removed and the mold used for next casting. Metal molds are better heat conductors than expandable nonmetallic molds. Hence, the solidifying casting is subjected to a higher rate of cooling, which in turn affects the microstructure and grain size within the casting.

1.2 Problem statements

The rice husks are wasted material that can be taking with good advantage by implementing and turn them into a products. This is due to the rice husk produced in a day is plenty in amount. And they are not even used yet just going to be disposed. Those materials are increasing in amount day by day. In order to make used of those materials, a new way of turning them into products have to be find.

1.3 Objective

The objectives of the projects are:

- To study and investigate an alternative material using rice husk composite for the roofing material for decorative.
- To design and develop the roofing mold for producing rice husk roof tiles
- To test and analyze of the new material on hardness, impact and tensile strength of the material.

1.4 Scope

The project will cover on proposing the alternative materials using rice husk composite for making the roof tiles. Polyester were used a matrix materials and the rice husk (natural fiber) as the reinforcement. The existing of roof tiles design will be studied in this project. The mold for roofing material will be designed and produced in this project. The roof tiles will be produced by using the roofing mold. The size of roof tiles will dependably on the designed mold while the material for the roof tiles is the rice husk composite material. The other materials will not be covered in this project. The roof tiles will be tested and analyzed the on the material properties. The test of tensile strength, elongation, hardness and impact strength will be conducted.

1.5 Report Structure

This report consist of 7 chapter which is Introduction, Literiture Review, Methodology, Design And Develop of the Roofing Mould, Testing And Analysis of The Roof Tiles, Results And Discussion , Conclusions And Recommendations.

a) Chapter 1 : Introduction

   Explain about the background, problem statement, objective and the scope of the project.

b) Chapter 2 :Literature Review

   This chapter explains about the studies of the project and the summarizations of the project. It consist of the archival collection of the project that is the information that can be obtain in order to accomplish the project.

c) Chapter 3 :Methodology

   This chapter discusses the methodology on how this project conducted. It consists of user requirements and problems identification, developments planning and others criteria that will be used for the project.

d) Chapter 4 :Design And Develop of The Roofing Mould

   This chapter focused on the design of the mould. It also shows the dimension of the mould. This chapter also covered the design of the roof tiles and also the fabrication of the roof tiles and the mould.

e) Chapter 5 :Testing And Analysis of the Roof Tiles

   This chapter will be the analysis of the roof tiles. The analysis will be the hardness test, impact test and also the tensile of the material. This chapter also will covered the comparison of the material composition analysis.

f) Chapter 6 : Results And Discussion

   This chapter will covered the testing of the composite material and the result of the test with the comparison with the roof tiles that been made by the

asbestos material. The results and discussion also will cover the analysis of the project material.

g) Chapter 7 : Conclusions And Recommendations

This Chapter will cover on the conclusion and the recommendations of the project for future works.

CHAPTER 2
LITERATURE REVIEW

2.0 Introduction

Literature review is a process of reviewing written and published knowledge on a topic which is from a journal article. The purpose is to present a summary of what it is and what is not known, indentify gaps or areas of controversy, and to identify the strengths and weaknesses of the currently published work. Meanwhile the theory is a comprises a collection of concepts, including abstractions of observable phenomena expressed as quantifiable properties, together with rules which is called scientific laws that express relationships between observations of such concept. Frequently, it comes out like journal, books, article and so on. The component of literature review is the actual research where they use the fact and logical concept that nobody can argue their research.

2.1 Rice Husk

Rice Husk is the hard self-protective coverings of grains of rice. In addition to protecting rice during the rising season, rice hulls can be put to use as building material, fertilizer, insulation material, or fuel. Rice husk basically the wasted material that is usually terminates by destroyed or the other hand is unused outside layer. If an professional method is available, the husk can be transformed into a useful form of energy to meet the thermal and mechanical energy requirements of the rice mills themselves. Overall, those are around 250 thousand tones rice husk created every year by the local factory. In the past and recent years, rice husk purpose has to

be research for the new product and the properties that can be applied as useful waste material. Rice husk are a class an insulate material because they are not easy to burn and less likely to allow moisture to spread mold or fungus. It was found out that rice husk when burned created amounts of silica. For these reasons it provides excellent thermal insulation.

Classification of rice husk ash, a deriving by-product of the burning of the rice husk during the rice processing is the object of this study. This by-product, for being rich in silica, can be an important raw material for the production of siliceous ceramics, such as thermal insulators and refractory. A combination of surface analysis, thermal analysis and microscopy analysis techniques was used for the categorization. The characterized by-product presented as main component the silica, under amorphous form, with a maximum content of alkalis around 1%, features that become it potentially interesting for the production of ceramic materials.

2.1.2 Rice Husk Properties

Figure 2.2: (a) Particle Rice Husk

Figure 2.2 (a) shows that the particle rice husk. The treatment of rice husk as a source for energy production is a departure from the perception that husks present disposal problems. The concept of generating energy from rice husk has great potential, particularly in those countries that are primarily dependent relative on imported oil for their energy needs. Rice husk (RH) is among natural fibers. It is the outer covering of paddy and accounts for 20% of its weight. RH is removed by rice milling and it contains cellulose 35%, hemicellulose 25%, lignin 20% and ash 17%