DESIGN HARNESSING HOT SPRING'S ENERGY SYSTEM FOR COCOA BEANS DRYING

By

Muhamad Izdan Zul Izzi b. Mahamad Rezali

Dissertation Report submitted in fulfillment of

the requirements for the

Bachelor of Engineering (Hons)

(Mechanical Engineering)

JANUARY 2009

Universiti Teknologi PETRONAS

Bandar Seri Iskandar

31750 Tronoh

Perak Darul Ridzuan

CERTIFICATION OF APPROVAL

DESIGN HARNESSING HOT SPRING'S ENERGY SYSTEM FOR COCOA BEANS DRYING

by

Muhamad Izdan Zul Izzi b. Mahamad Rezali

A project dissertation submitted to the
Mechanical Engineering Programme
Universiti Teknologi PETRONAS
in partial fulfilment of the requirement for the
BACHELOR OF ENGINEERING (Hons)
(MECHANICAL ENGINEERING)

Approved:

_____

(Tn. Hj. Kamal Ariff b. Zainal Abidin)

UNIVERSITI TEKNOLOGI PETRONAS
TRONOH, PERAK
January 2009

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

_____

MUHAMAD IZDAN ZUL IZZI B. MAHAMAD REZALI

ABSTRACT

Geothermal energy is a one type source of alternative energy. Countries like United Stated, Australia, New Zealand, China, Canada and Turkey have used this energy for some applications such as for electricity generation, space and district heating, air conditioning, greenhouse heating and others. The presence of volcanoes, hot springs and other thermal phenomena lead people to explore and study energy produced inside earth. In Malaysia, there are also some places have the hot springs in Tambun, Sungkai, Pengkalan Hulu, Manong and others and currently use for recreation and tourism. For this project, the author wants to study and understanding this one type of alternative energy and design suitable system to harness hot spring's energy and used for cocoa beans drying (industrial application). The problems that are being created from energy price hiking and our equator climate lead the author to find the solutions. The target is to design a suitable system which can harness hot spring's energy and applied it on cocoa beans drying process. Since the energy is free and continuously produced inside the earth, the author wants to find the way how to commercial the energy. The important elements that need to be determine before starts the design is the behaviour of cocoa beans while drying and the unknowns related to the design that must being determine using the experiment and engineering calculations. The design must be in details for future works. This project can solve the problems of inconsistently weather condition and high price for fuel and gas that being used for artificial drying. This project also can make improvement with maximizing the quantity of the dried cocoa beans without affecting the quality.

ACKNOWLEDGEMENTS

Bless to God for giving the author strength and chance to complete the Final Year Project (FYP) and this dissertation report. The author would like to extend his greatest gratitude to many individuals who contributed to this project. The first thank goes to his UTP Supervisor, Tn. HJ. Kamal Ariff b. Zainal Abidin for the supervision, information and advises plus giving freedom to learn throughout the project. This project could not complete without extensive assistance provide by Tn. Hj. Kamal Ariff b. Zainal Abidin The author also indebted with UTP Mechanical Engineering Lecturer, Prof Dr. Vijay R. Raghavan who spending his time with author giving technical expertise advises, explanations, knowledge and experiences as well. Thank you for your help. To all lecturers from Mechanical Engineering Department of University Technology of PETRONAS, thanks for giving the author cooperation and support in undergoing this project.

The author also wants to thank Mr. Dzazali Ayub from Mineral & Geosciences Department Malaysia, Dr. Lee Choon Hoi and Mrs Hajjah Faridah from Malaysia Cocoa Board who are really help him by giving information and advises during his visit. Last but not least, thank you to all friends and family who help author in making this project possible to finish, including the support, advice, encouragement and praying.

.

Thank you.

The Author,

Muhamad Izdan Zul Izzi b. Mahamad Rezali
Mechanical Engineering Student, UTP

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

Figures

Tables