



UNIVERSITI PUTRA MALAYSIA

***EFFICIENCY OF SOLAR BOWL MODEL USING ALUMINUM-ZINC
ALLOY COATED STEEL BASED REFLECTOR***

DAN JUN XIAN

ITMA 2012 9

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MASTER OF SCIENCE

UNIVERSITI PUTRA MALAYSIA

2012

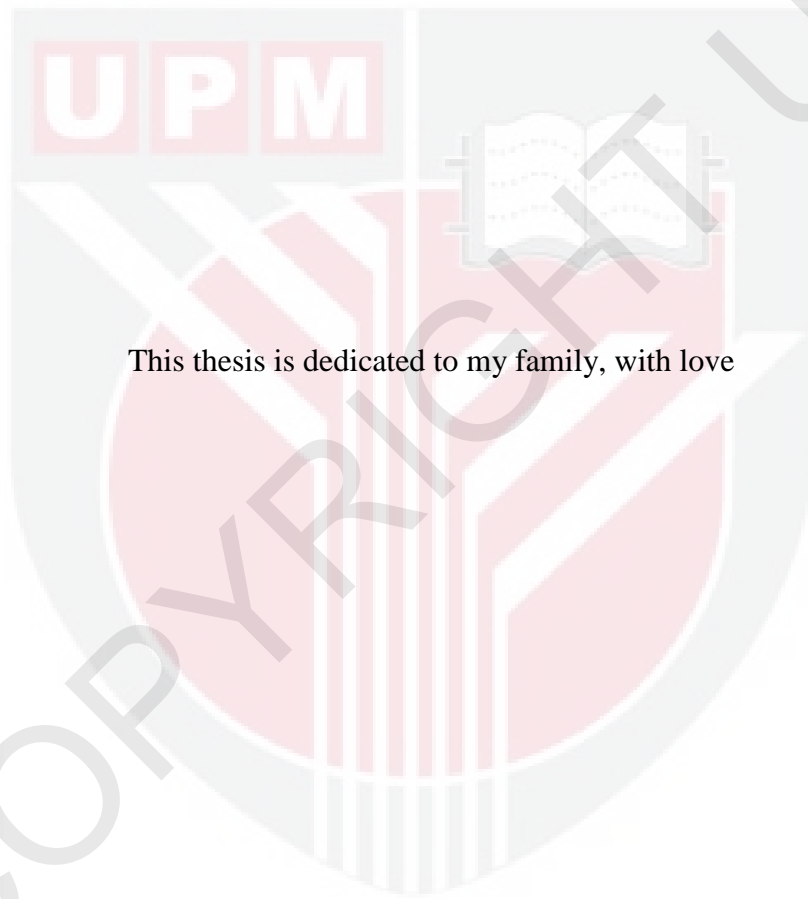
**EFFICIENCY OF SOLAR BOWL MODEL USING ALUMINUM-ZINC ALLOY
COATED STEEL BASED REFLECTOR**

By

DAN JUN XIAN

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in
Fulfilment of the Requirements for the Degree of Master of Science**

March 2012



This thesis is dedicated to my family, with love

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Abstract of this thesis presented to the Senate of Universiti Putra Malaysia as partial fulfilment of the requirement for the degree of Master of Science.

**EFFICIENCY OF SOLAR BOWL MODEL USING ALUMINUM-ZINC ALLOY
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March 2012

Chairman: Associate Professor Nor Mariah Bt Adam, PhD PE

Faculty: Institute of Advanced Technology

Working concept of Solar Bowl is to concentrate the solar radiation onto a receiver by a group of reflector plate. There are two specific objectives for this study, first is to design the reflector alignment using Catia software; second is to determine the energy efficiency of the model. 55% aluminum-zinc alloy metallic coated steel was used as the reflector.

The previous work of other researchers and the Sun-Earth geometry will be studied. The design of heliostat of other researchers will be used as reference for the design of heliostat for solar bowl UPM. Water was used to conduct the efficiency test. The basic concept of efficiency of the model Solar Bowl UPM is output power divided by input power. Output power is the total energy to heat up the water temperature over certain time duration. Input power is the total solar power entering into the solar bowl model in the same time duration.

Catia software was used to determine the suitable alignment of the reflector plate. The geometry of the reflector was designed according to the Law of Reflection. The reflection pattern of the solar ray was simulated.

An efficiency test was conducted to determine the efficiency of the solar bowl model.

Efficiency test for the solar bowl model was conducted for 30 days.



Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi sebahagian keperluan untuk ijazah Master Sains.

KECEKAPAN MODEL KAWAH SURIA GUNA LOGAM ALOI ALUMINUM-ZINK BERSALUT BESI SEBAGAI PAPAN PEMANTUL

Oleh

DAN JUN XIAN

Mac 2012

Pengerusi: Prof Madya Nor Mariah Bt Adam, PhD PE

Fakulti: Institut Teknologi Maju

Konsep bekerja untuk kawah suria adalah menumpu sinaran suria kepada penerima dengan menggunakan sekumpulan papan pemantul. Terdapat dua matlamat yang khusus untuk kajian ini, pertama adalah reka bentuk untuk penjajaran pemantul dengan menggunakan perisian Catia. Kedua adalah menentukan kecekapan papan pemantul 55% logam aloi aluminum-zink bersalut besi untuk model solar bowl UPM.

Kajian yang dibuat oleh penyelidik lain dan geometri matahari-bumi telah dirujuk.

Kawasan pemantul yang direka oleh pengajian lain akan diambil sebagai rujukan untuk rekabentuk kawasan pemantul Kawah Suria UPM. Air telah digunakan untuk menjalankan eksperimen kecekapan. Konsep kecekapan adalah kuasa output dibahagi dengan kuasa input. Kuasa output adalah kuasa yang digunakan untuk meningkatkan

suhu air dalam masa yang tertentu. Kuasa input adalah kuasa suria yang terkumpul pada model Kawah Suria UPM dalam masa yang tertentu.

Perisian Catia telah digunakan untuk menentukan susunan papan pemantul untuk model Kawah Suria UPM. Kecondongan papan pemantul direka mengikut Hukum Pantulan.

Corak pantulan cahaya akan disimulasi guna perisian Catia.

Ekperimen kecekapan dijalankan untuk menentukan kecekapan model tersebut.

Eksperimen untuk menentukan kecekapan Kawah Suria UPM dan dijalan selama 30 hari.

ACKNOWLEDGEMENTS

First and foremost, I would like to express my deepest thanks and appreciation to my supervisor, Assoc. Prof. Dr. Nor Mariah Bt Adam, and co-supervisor Professor Dr. Azmi B Zakaria for their advise, guidance and encouragement throughout my thesis writing. They help me greatly by giving suggestion for my experiment method and offering insightful comments, which make this thesis a reality.

I would like to thank En. Mohd Ali Bin Mat Nong and Pn. Roslina Binti Abdul Rashid from ITMA who have helped me to prepare the apparatus for my thesis experiment. I appreciate for their patience on describe the function and using method of the apparatus. They also give me some useful advises on the experiment method.

Last but not least, I would like to express my heartfelt thanks to my dearest family for their constant support, love and encouragement throughout my study period. I thank in particular my dear girlfriend, Lim Ann, who share my burden constantly and continuously give encouragement and full support to me in completing my study and thesis.

I certify that a Thesis Examination Committee has met on 23 Mac 2012 to conduct the final examination of Dan Jun Xian on his thesis entitled “Efficiency of Solar Bowl Model Using Aluminum-Zinc Alloy Coated Steel-Based Reflector” in accordance with the Universities and University College Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The committee recommends that the student be awarded the Master of Science.

Member of the Thesis Examination Committee were as follows:

Chairman

Y. Bhg. Prof. Datin Dr. Napsiah bt Ismail
Jabatan Kejuruteraan Mekanikal dan Pembuatan
Fakulti Kejuruteraan
Universiti Putra Malaysia

Internal Examiner

Prof. Madya Dr. Mohd Zainal Abidin bin Ab. Kadir
Jabatan Kejuruteraan Elektrik dan Elektronik
Fakulti Kejuruteraan
Universiti Putra Malaysia

Internal Examiner

Y. Bhg. Y.M. Dr. Raja Mohd Kamil bin Raja Ahmad
Jabatan Kejuruteraan Elektrik dan Elektronik
Fakulti Kejuruteraan
University Putra Malaysia

External Examiner

Y. Bhg. Prof. Dr. Mohd Yusof Sulaiman
Institut Pengajian Tenaga Solar, Tingkat 3
Perpustakaan Tun Seri Lanang
Universiti Kebangsaan Malaysia

SEOW HENG FONG, PhD

Associate Professor and Deputy Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:

This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfillment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

Nor Mariah Adam, PhD

Associate Professor
Faculty of Engineering
Universiti Putra Malaysia
(Chairman)

Azmi Zakaria, PhD

Professor
Faculty of Science
Universiti Putra Malaysia
(Member)

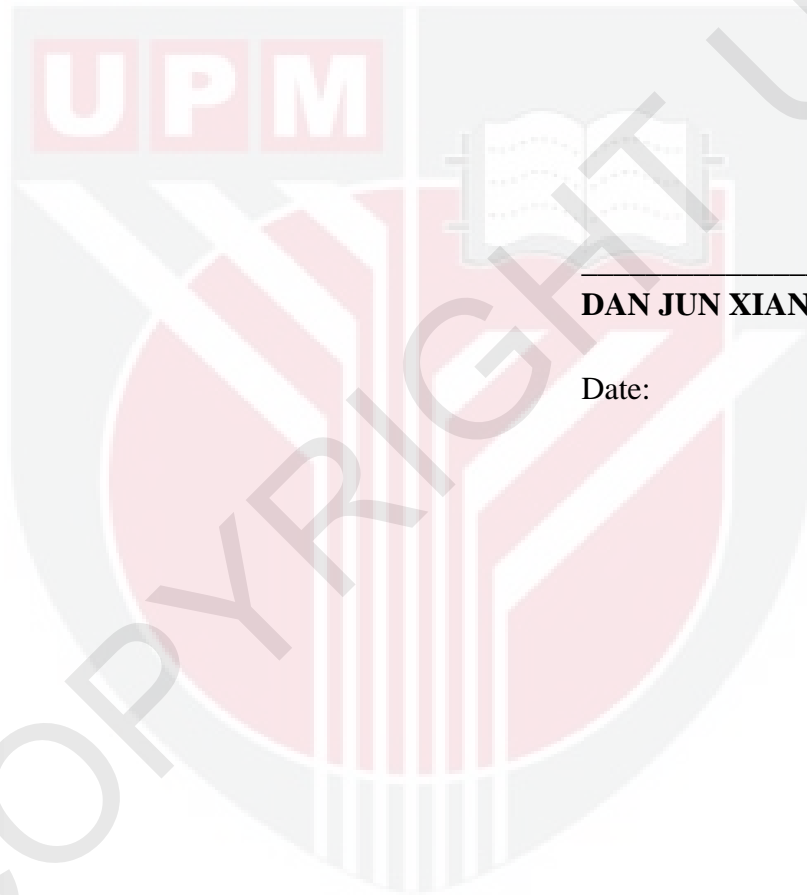
BUJANG BIN KIM KUAT, PhD

Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:

DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously and is not concurrently submitted for any other degree at University Putra Malaysia or at any other institution.



DAN JUN XIAN

Date:

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