



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**GREEN FEATURE MODELING FOR HOME APPLIANCES
CONCEPTUAL PRODUCT**

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor's Degree in Manufacturing Engineering Technology (Product Design) (Hons.)

by

FATIN AMIRA BINTI ANUAR

B071110118

920907-11-5650

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This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Manufacturing Engineering Technology (Product Design) (Hons.). The member of the supervisory is as follow:

.....

(Project Supervisor)

ABSTRAK

Oleh itu, projek ini dihasilkan adalah untuk mencipta peralatan rumah yang berkonsepkan teknologi hijau. Tujuan projek ini adalah untuk mengkaji bagaimana untuk mengaplikasikan teknologi hijau dalam reka bentuk peralatan rumah , untuk mengintegrasikan faktor-faktor alam sekitar pada peringkat awal proses reka bentuk. Selain itu, tujuan kajian ini adalah untuk menganalisis produk yang kurang memberikan kesan minimum kepada persekitaran dan pada masa yang sama masih mengekalkan fungsi utamanya. Di samping itu, tujuan kajian ini adalah untuk mengkaji alat reka bentuk CAD yang berada di pasaran untuk mengkaji kemampuan. Setelah mengumpul maklumat mengenai teknologi hijau , perkakas rumah dan pembangunan mampan, beberapa konsep reka bentuk telah dikaji. Setelah memilih reka bentuk tiga dimensi model produk yang sesuai, reka bentuk tersebut akan melalui analisis simulasi kemampuan. Simulasi tersebut akan dijalankan oleh alat reka bentuk CAD yang dipilih untuk menganalisis kemampuan. Selepas itu, satu laporan telah disediakan. Oleh itu, pada akhir projek ini, produk yang dicipta dijangka memberi kesan minimum terhadap alam sekitar.

ABSTRACT

Recently, there are many new home appliances products being develop. But, most of them are design and manufactured without taking into the considerations of the product impacts toward environment. Therefore, this project is to study about the green feature in CAD modeling in home appliances conceptual product. The aim of this project is to research about the application of green technology considerations in home appliances design, to integrate environmental factors at early stages of the design process. Besides that, the aim of this study is to design a product that give less impact towards the environments whilst maintaining its main function and lastly to study the CAD design tools available for sustainability. After going through all the research of green technology, home appliance and sustainability development, a few CAD designs are chosen. After choosing the suitable 3D modeling of the product, the model will go through the sustainability simulation analysis. The simulation will be conducted by using the CAD design tool for sustainability analysis. Therefore, at the end of this project, the design product analyzed is expected to give minimum impact towards environment.

DEDICATION

This thesis is dedicated to my parents who taught me that the best kind of attitude to have is that never stop learning and they always encourage me that if it is done one step at a time, even the largest task can be accomplished.

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

ABS	-	Acrylonitrile Butadiene Styrene
ABS PC	-	Acrylonitrile Butadiene Styrene Polycarbonate
APCAEM	-	Asian and Pacific Centre for Agricultural Engineering and Machinery
DFMA	-	Design for Manufacture and Assembly
LCA	-	Life Cycle Assessment
LCE	-	Life Cycle Engineering
PDD	-	Product Design and Development
PE	-	Polyethylene
PVC	-	Polyvinyl Chloride

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Nowadays, the term “Green Technology” becomes imperative due to the people’s closer attention of clean energy technologies. The green technology was started since the alternative energy technologies that have existed over the past century (Madrigal, 2011).

With the rising profits of green development in the past few years, the green technology based products have been booming. In simple words, the green technology can be defined as environmental healing technology that reduces environmental damages created by the products and technologies for peoples' conveniences (JHA, n.d.). Besides, green technology is relying on various sources of energy. Peoples will save the environment from pollutions and other danger as they applying green technology in their daily life.

During the past several years, there are many innovative and energy efficient home appliances in the market. With the variety functions in home appliances, it helps us to workout in our routine days easily. Therefore, by applying the green technology in home appliances, there are extras benefits to the users. The combination of green technology into home appliances will lead to eco friendly surroundings (Fenlon, 2013).

This project will transform the features of the home appliance into the Green technology concept to create sustainable living communities. Sustainable development is development that follows the importance of the future without compromising the ability of next generations to meet their own needs (Annex, 1987). Therefore, this project will include the analysis of sustainability of the home appliances based on green technology development.

1.2 Problem Statement

Nowadays, as the world been booming with varieties of modern technologies in home appliances, the earth facing many problems that effect or give bad impact to the environment. For example, the rise of global warming issues and many kinds of pollutions such as water pollution, sound pollution and air pollution. In general, today new products are designed without taking into the considerations of the impacts towards environment. Besides, most home appliances recently use high energy consumption which will give bad impact towards environment.

1.3 Objective

This project needs to do some research and studying to overcome the problem. To achieve that, during this project, I needed to identify and analyze all the problems and weakness. Therefore, below are the lists of objectives to be conduct before going details during the process.

1. To research about the application of green technology considerations in home appliances design.
2. To integrate environmental factors at early stages of the design process.
3. To develop product that give less impact towards the environments whilst maintaining its main function.
4. To study the CAD design tools available for sustainability.

1.4 Scope

During this project project, as the analysis become more specific, there is need to list out all the scopes of this project. The scopes of this project are as follows:

1. **Home appliances:** Identifying the common problems of home appliances that occur to the users. Besides, identifying the user's need or desire concept of home appliances by comparing with the existing products.
2. **Data Acquisition:** Analyze the data and result from the survey of conducting interview and distribute questionnaires.
3. **Green Technology:** Research of green technology features that suitable to be applied into the home appliances.
4. **Sustainability:** In this section, I will analyze the design of the product by using the CAD design tool available for sustainability. In this case, it will include the analysis of the product's cost, effect to environment and also its durability.

1.5 Conclusion

Through this chapter, it will cover the initial process in conducting a new project. Firstly, the background of the study is stated clearly, followed by problem statement of this study. Then, from the problem statement, the objectives of the project are constructed and lastly, the scope of this study will be discussed.

CHAPTER 2

LITERATURE REVIEW

2.1 Green Technology

2.1.1 Overview

In the early 20th century, there are applications of solar heaters that used to warm the water for shower in South California and facilities of electric taxi cabs along the Manhattan's street. It proved that the Green Technology had been starting to develop over the past century (Chron, 2013).

Green Technology can be defined as the application and evolution of products, equipment and systems that used to protect the natural environment and resources, which minimize and lower the negative impact of human activities (Kettha, 2013). From the definitions before, it shows that the main purpose of developing the Green Technology is to preserve environment on the earth from being harm. Asian and Pacific Centre for Agricultural Engineering and Machinery (APCAEM) did a study entitled A Feasibility Study on the Application of Green Technology for Sustainable Agriculture Development. In this study, the term green technology is a wide way term for more environmentally friendly solutions (pravinsankalp, 2014) and the Green Technology application is focused at the linking of agriculture with the environment-friendly technology in which it will contribute to both poverty reduction and sustainable agriculture development. The findings of this study

identify the reasons to develop the Green Technology. There are due to the environmental concerns, increasing demand for green production in which will increasing the income and lastly due to achieving sustainable agriculture development.

Michael Hasper (2009) in his research entitled “Green Technology in Developing Countries: Creating Accessibility through a Global Exchange Forum” said that “A Green Technology is becoming an attractive component companies business plans”. From that, it shows that Green Technology come out as one of the reasons to develop a business. Recently, many companies include adoption of Green Technology practices to supplement their company’s production techniques for goods and services (Johnson, 2014). Public relations, cost savings, healthier workplace and consumer demand are normally the reasons of companies that choose to going green in their business systems (Chron, 2013).

2.1.2 Purpose of Developing Green Technology

Jonathan M.W.W. Chu (2013) developed a study of Developing and Diffusing Green Technologies: The Impact of Intellectual Property Rights and their justification. In his study, he said that Green Technology likely called as “clean technology”, “environmental technologies”, “climate related technologies”, “mitigation and adaptation technologies” and so on. Besides, he said that the environmental impacts arise from the pollution, consumption and destruction of natural resources (Annex, 1997). Due to the problems, communities starting to find solutions to solve it and it become one of the reasons the Green Technology had been developed (Kyoto, 1997). It shows that to conserve the environment from damage is become one of the purposes of Green Technology that been discussed by Jonathan (2013) in his study.

To reduce greenhouse gas emissions is one of the reasons to develop Green Technology. To achieve it, communities must concern with various dimension of the climate change problem (Supra, 2000). Jonathan (2013) present in his study that the green technology is developed to facilitate accessibility. To make the technology

become more accessible, the green technology must decrease cost in the production or in the whole systems. The decrease cost in the production and system is expected due to technologies advances, good performance in installation and also due to greater understanding in choosing the best materials in the production (ppj, 2013).

The “Green Technology strategy and leadership for clean and sustainable communities” journal was reported by Racquel Palmese in 2009. This study focuses on green building construction in California. By going deeper into the report, Racquel Palmese describes that the green building was created to increase the efficiency in using the amount of water, energy and other important resources. From that, it will minimize waste, pollution and other things that subscribes to environmental degradation and also to develop place that contribute to better health and productivity.

2.1.3 Application of Green Technology

Green Technology had been developed to a variety of sectors (ppj, 2013) (sector, 2013). The characteristics or features that been applied to each sector is different compared to each other. There are many types of application for green technology to be applied and it will be divided in terms of sectors in green technology such as Energy Sector, Building Sector, Water and Waste Management Sector and lastly the Transportation Sector.

Energy sector can be defined as a category of system that include with creating or supplying the energy. Normally, it will relate to a big organizations or company that explores the development of energy that created through the environment (sector, 2013). In this sector, the performance is follow by supply and demand for worldwide energy. Therefore, in Energy Sector, it includes the application of Green Technology in power generation, energy supply management that created by the industrial and commercial sectors, energy utilization sector and also in demand side management programs.

Besides that, in Building Sector, it is based on an adoption of Green Technology in management, construction and maintenance. The term that related in this sector and the Green Technology is Green Building. Green building is an environmentally sustainable building that being design, construct and operated to give minimum effect to the environment (Green, 2013). In the Build Green page, it stated the strategies and ideas to achieve a green building. It includes by reducing the energy consumption, conserving the water and also reuse or recycling the waste that being made by the communities.

The strategies to achieve a green building that been stated before also applicable to Water and Waste Management Sectors (kettha, 2013). In the Project Eligibility Criteria for Water and Waste Management Sector by Green Tech Malaysia, it discusses the ways to manage and utilize the water resource. Some of the technique to manage the water resource are better quality of water supply to user, recycling and reuse and also use the green materials and equipments.

Lastly, in the Transportation Sector, it includes the application of Green Technology in transportation system, infrastructure, vehicles and so on (ppj, 2013). Nowadays, in many automotive companies are focused on more sustainable vehicles that are related to Green Technology in order to minimize the harmful effect of fuel to the environment. At the same time, they want to reduce the fuel cost of the transportation (Energy, 2014).



Figure 2.1: Some applications of Green Technology in Energy Sector.

Source by: portal.ppj.gov.my/c/document_library/get_file?p_l_id...pdf



Figure 2.2: Applications of Green Technology in Building Sector.

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Figure 2.3: Applications of Green Technology in Water and Waste Management Sector.

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Figure 2.4: Applications of Green Technology in Building Sector.

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