



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**DESIGN FOR ENVIRONMENT (DFE) IMPROVEMENT ON
ELECTRONIC PRODUCT: A CASE STUDY ON A MOBILE
PHONE HOUSING**

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

by

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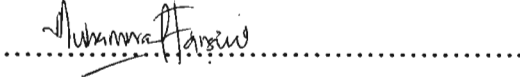
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DECLARATION

I hereby, declared this report entitled “Design For Environment (DFE) Improvement on Electronic Product: A Case Study on a Mobile Phone Housing” is the results of my own research except as cited in references.

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APPROVAL

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ABSTRACT

Design for Environment (DFE), covers any design activity which aims at improving the environmental performance of a product. For further study of Design for Environment, Nokia N70 mobile phone housing was selected as a component to be research. The objective of this research is to analyze the current electronic components by using Design for Environment (DFE) and Design for Sustainability (DFS) approaches analysis. This report describes research about sustainable and environmental impact of mobile phone component. By using Solidworks Sustainability analysis software, the original part of Nokia N70 mobile phone housing was analyzed to know the environmental impact level. New improved design and material selection process was implement in order to eliminate component disposal and to minimize the environmental impact of the product by reduce and modification part and suitable selection material. Finally, the comparative analysis can be made to determine whether the new design have improvement or not.

ABSTRAK

Rekabentuk untuk Persekitaran (DFE), meliputi segala kegiatan rekabentuk yang bertujuan untuk meningkatkan prestasi persekitaran sesuatu produk. Untuk kajian yang lebih lanjut, tentang Rekabentuk untuk Persekitaran (DFE), penutup telefon bimbit Nokia N70 dipilih sebagai komponen kajian. Objektif kajian ini adalah untuk menganalisis komponen elektronik pada masa ini dengan menggunakan pendekatan Rekabentuk untuk Persekitaran (DFE) dan Rekabentuk untuk kebolehtahanan (DFS). Report ini juga menceritakan tentang ketahanan dan kesan persekitaran komponen kepada alam sekitar. Dengan menggunakan perisian Solidwork Sustainability analisis, penutup asal telefon bimbit Nokia N70 akan dianalisis untuk mengetahui tahap kesan kepada persekitaran. Rekabentuk baru dan proses pemilihan bahan yang sesuai akan dilakukan bertujuan untuk mengurangkan komponen yang tidak diperlukan dan juga untuk mengurangkan kesan kepada persekitaran. Akhir sekali, perbandingan analisis akan dibuat sama ada rekabentuk yang baru mempunyai peningkatan atau tidak..

DEDICATION

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LIST OF ABBREVIATIONS

ABS	-	Acrylonitrile butadiene styrene
DFA	-	Design for Assembly
DFD	-	Design for Disassembly
DFE	-	Design for Environment
DFM	-	Design for Manufacturing
DFP	-	Design for Production
DFR	-	Design for Recycling
ELP	-	End of Life Products
EPA	-	Environmental Protection Agency's
HDPE	-	High Density Polyethylene
LCA	-	Life cycle assessment
LCD	-	Liquid Crystal Display
LCE	-	Life Cycle Engineering
LCI	-	Life Cycle Inventory analysis
LCIA	-	Life Cycle Impact Assessment
OPPT	-	Pollution Prevention and Toxics
PB	-	Polybutadiene
PC	-	Polycarbonate
PDP	-	Product development process
PMMA	-	Polymethylmethacrylate
PSM	-	Projek sarjana muda
PSS	-	Product-Service Systems
UTEM	-	Universiti Teknikal Malaysia Melaka

CHAPTER 1

INTRODUCTION

1.0 Introduction

This chapter presents the general ideas of the research. There are basically containing four main sections in this chapter such as background, problem statement, objective and scope of this project.

1.1 Background

Nowadays, many people in our society are beginning to focus on the importance of environmental preservation. Pollution is increasingly making the surrounding air, water and ground contaminated. This is bringing the environmental practices of industry into the neighborhoods, communities and homes of all citizens. As a result, many citizens are becoming concerned with the environmental practices of the industries that surround them. Governments are also stepping up on their environmental regulations, policies, and procedures which restrict industry's environmental practices. This in turned has compelled many industries to improve their environmental record to produce greener products and use greener processes. With the environmental issues problem that occurs today, there are many companies promote to implementing Design for Environment (DFE) approaches on their product to be an environmental friendly.

Design for Environment (DFE) is a concept that refers to a variety of design approaches that attempt to reduce the overall environmental impact of a product, process or service, where environmental impacts are considered across its life cycle. DFE also know as Life cycle Assessment (LCA), Eco-Design, End-of-Life (EoL) design, green product, design and environmental friendly product. Although, it has a referred with different name, but it's still stay the same with its objective, benefit and its method. The main aim for implementation DFE is to ensure our environment is under control from dangerous threat from poison which produces by the product. Design for Environment seeks to understand the life cycle of the product and its impact on the environment at each of its life stages and to make better decisions during product design so that environmental attributes of the product are kept at a desired level.

Global environmental issues have been brought about with the expansion of human activities and are related to everyday social activities. The electronic and electrical industries have a very close relationship with such global environmental issues, because of their products, which are being utilized in everyday human life, and because of their production processes. The relationship of environmental issues with the electronic and electrical industries begins with the traditional activity of prevention of the pollution and the contamination which production processes generate in the area close to their facilities. The relationship is found in such areas as the prevention of harmful effects on the global environment which production activities cause extensively around their facilities and, moreover, in the reduction of the impact the products have on the global environment, both during and after use. Recently, such a relationship has been observed in the development of technologies and in the manufacturing of products which contribute to the prevention or reduction of pollution in the global environment.

As an example, electronic industries today generate more electronic products for human utility and at the same time it also increases the electronic waste (e-waste). Electronic product contains toxic and hazardous materials, and if thrown away in landfill, can cause environmental damage. Electronic product and accessories contain concentrations of

toxic heavy metals or other metals including cadmium, lead, nickel, mercury, manganese, lithium, zinc, arsenic, antimony, beryllium, and copper. These metals are non bio degradable and are also bio-accumulative. They do not break down naturally. Decomposing waste forms poisonous liquids that can seep into groundwater and then into rivers and streams, contaminating the soil. The metals that build up in the soil can harm the environmental ecosystem. That's why every industry electronic company today focusing on design for environment for every product that they produce in order to minimize the hazardous material and at the same time they can maximizing the recycling of the product.

1.2 Problem statement

Nowadays, with residential population total increase in our country Malaysia around twenty four millions, utilization rate of electronic product also increasing together by technological advancements. So, with utilization rate increase electronic product today, indirectly it also raise the rate of elimination electronics know as e-waste. Mobile phone is one of example electronic product that contain toxic and hazardous. The toxic substances contained in each of these components pose a serious environmental problem by leaching from decomposing waste in landfills into ground water, contaminating the soil. The materials that build up in the soil can harm the environmental ecosystem. Toxic and hazardous materials disposal that contain in mobile phone also can give serious impact on human health such as cancer and so on.