

**ELECTROMAGNET TORCH LIGHT DESIGN AND  
DEVELOPMENT**

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**KOLEJ UNIVERSITI TEKNIKAL KEBANGSAAN MALAYSIA**



**NATIONAL TECHNICAL UNIVERSITY COLLEGE OF  
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**Electromagnet Torch Light  
Design and Development**

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National Technical University College of Malaysia for the Degree of  
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By

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is the results of my own research  
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## APPROVAL

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## **ABSTRACT**

Generally, this project is focused on 'Electromagnet Torch Light Design and Development'. The purpose is to develop a concept design of electromagnet torch light based on manufacturing methods that available especially in MELAKA. The Computer-Aided design (CAD) is used to design the electromagnet torch light and model of prototype or concept demonstrator were build. From that, customers need, product design specification, concept generation, concept selection, embodiment design, detail design has been analyzed. Furthermore, this project also take into consideration about market research and product competitor beside material selection and manufacturing process to produce an electromagnet torch light.

## **DEDICATION**

*Specially dedicated to my beloved family especially my father (Haji Tuah Bin Haji Hamid) and my mother (Sadah Bte Lazim); whose very concern, understanding, supporting and patient. Thanks for everything. To All My Friends, I also would like to say thanks. The Work and Success will never be achieved without all of you.*



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# LIST ABBREVIATIONS, SYMBOLS, SPECIALIZED NOMENCLATURE

"	-	Inch
°	-	Degree
C	-	Celcius
Ft	-	Feet
M	-	Meter
N	-	Newton
Cm	-	Centimeter
LED	-	Light Emitting Diode
AC	-	Alternate Current
DC	-	Direct Current
QFD	-	Quality Function Deployment
PDS	-	Product Design Specification
$\Sigma^+$	-	Total positive items
$\Sigma^-$	-	Total negative items
$\Sigma S$	-	Total same items
CATIA	-	Computer Aided Three dimensional Interactive Application
CAD	-	Computer-Aided Design
DFM	-	Design for Manufacturing
DFA	-	Design for Assembly
APT	-	Automatically Programmed Tool
2D	-	2 Dimension
3D	-	3 Dimension
Kg	-	Kilogramme
$C_{mat}$	-	Total Materials Cost
$C_{mat, d}$	-	Material Direct Cost
$C_{mat, o}$	-	Materials Overhead Cost

$C_{pr}$	-	Total Production Cost Including Assembly
$C_{lab,d}$	-	Direct Labor Cost
$C_{fix}$	-	Machine, Setup or Initial Cost
$C_{pr,o}$	-	Production Overhead Cost
$t_i$	-	Mold Cycle Time
$n_c$	-	Number of Cavities in Mold Base
$C_r$	-	Machine Rate
$C_s$	-	Machine Supervision Rate
$C_n$	-	Cost of Manufacturing
$n_c$	-	Cavities in Mold Base
$C_b$	-	Cost of Mold Base
$C_p$	-	Cost of Polymer per Component
$t_i$	-	Mold Cycle Time
$C_r$	-	Machine Rate
$C_s$	-	Machine Supervision Rate
$n_c$	-	Number of Cavities in Mold Base
$C_{tool}$	-	Tool Cost
$w$	-	Weight of Part
$C_{m,mt}$	-	Material Cost per Unit Weight
$C_{WM}$	-	Material (electrodes) Cost
$C_{WE}$	-	Energy Cost
$C_{WL}$	-	Labor cost
$C_{prep}$	-	Preparation
$C_W$	-	Welding Cost
$C_{post}$	-	Post-processing Cost
$C_{mat}$	-	Material Cost
$C_{lab,d}$	-	Direct Labor
N	-	No
Y	-	Yes
+	-	Better
S	-	Same

-	-	Worse
KUTKM	-	Kolej Universiti Teknikal Kebangsaan Malaysia
VS	-	Very strong
S	-	Strong
MO	-	Moderately
MI	-	Mildly
N	-	Not at all
9	-	Strong Relationship
3	-	Moderate Relationship
1	-	Weak Relationship
blank	-	No Relationship
T	-	They
W	-	We
g	-	Gram
mm	-	Milimeter
RM	-	Ringgit Malaysia

# CHAPTER 1

## INTRODUCTION

### 1.1 Background

In globally-linked economy, product design and development is the basis for successful competition in markets as well as compete effectively on a global basis especially in MELAKA.

Actually, product design and development is the set of activities beginning with the design and the perception of a market opportunity and ending in the production, sale and delivery of a product. Basically, the generic product development process has six phases such as planning, concept development, system-level design, detail design, testing and refinement, and production ramp-up. But, this research focused on concept development of product from the aspect of marketing, design and manufacturing.

The product for this research is electromagnet torch light. The application of CAD such as CATIA and Solid Work have been used to design and analysis this product. Beside that, a business plan is important to clarify in this project which is a summary of how a business owner or manager intends to organize an entrepreneurial endeavor from aspect marketing, competitor, promotion and sales of electromagnet torch light.