

DEVELOPMENT OF A USER-FRIENDLY SHUTTLECOCK
COLLECTOR MACHINE

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SUPERVISOR DECLARATION

“I hereby declare that I have read this thesis and in my opinion this report is sufficient in term of scope and quality for the award of the degree of Bachelor of Mechanical Engineering (Design and Innovation).”

Signature : _____

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**This report is submitted in
fulfillment of the requirements for the award of
Bachelor of Mechanical Engineering (Design & Innovation)**

**Faculty of Mechanical Engineering
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DECLARATION

“I hereby declare that the work in this report is my own research except for summaries and quotations which have been duly acknowledged.”

Signature : _____
Author : _____
Date : _____

DEDICATION

To my beloved parents

ACKNOWLEDGEMENT

The author is feeling grateful to the Final Year Project supervisor, Mr. Mohd Ruzi Bin Harun, whose help, give many suggestions and encouragement in solving problems as well as generating ideas on completing this project. A very big appreciation would be given to him for the guidance on improvement in my report writing and presentation skills.

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ABSTRACT

Shuttlecock collector machine a new invention to all badminton players. Usually this machine used in training session. Shuttlecock collector machine will help the players to collect all the shuttlecock in shortest time without wasting time and energy to move around the badminton court for collecting the shuttlecock. This machine also has provided protection to shuttlecock from damage for recycle used. This study aims to develop a new shuttlecock collector machine. New shuttlecock collector machine shall be designed using criteria of product design and development. Additionally, the design of a system that should be in accordance with the requirements of players. To produce a good product, it must follow process of engineering design. Shuttlecock collector will be designed through processes of manufacture of a product or development properly to fulfill the criteria set. The selection of design concepts have been made to find a final design of the product. This collection will be analyzed and reviewed carefully to detect shortcomings in the last concept design. It is intended to ensure that the system is able to develop a success product and solve all the players' problem.

ABSTRAK

Mesin pengumpul bulu tangkis ialah ciptaan baru kepada semua pemain badminton. Kebiasanya mesin ini digunakan dalam sesi latihan. Mesin pengumpul bulu tangkis ini akan membantu pemain untuk mengumpul semua bulu tangkis dalam masa yang singkat tanpa membuang masa dan tenaga bergerak ke seluruh gelanggang badminton untuk mengumpul bulu tangkis. Mesin ini juga melindungi bulu tangkis dari kerosakan untuk digunakan semula dan digunakan untuk sesi yang lain. Kajian ini bertujuan untuk membangunkan satu mesin baru iaitu Mesin pengumpul bulu tangkis. Mesin pengumpul bulu tangkis baru hendaklah direka dengan menggunakan kriteria reka bentuk dan pembangunan produk. Selain itu, reka bentuk sistem yang perlu mengikut kehendak pemain. Untuk menghasilkan produk yang baik, ia mesti mengikut proses reka bentuk kejuruteraan. Mesin pengumpul bulu tangkis akan direka melalui proses pembuatan sesuatu produk atau pembangunan yang betul untuk memenuhi kriteria yang ditetapkan. Pemilihan konsep reka bentuk telah dibuat untuk mencari reka bentuk yang terbaik. Koleksi ini akan dianalisis dan dikaji dengan teliti untuk mengesan kelemahan dalam reka bentuk konsep yang terakhir. Ia bertujuan untuk memastikan sistem tersebut mampu untuk membangunkan produk kejayaan dan menyelesaikan semua masalah pemain.

TABLE OF CONTENTS

CHAPTER	CONTENT	PAGE
	DECLARATION	II
	DEDICATION	III
	ACKNOWLEDGEMENT	IV
	ABSTRACT	V
	ABSTRAK	VI
	LIST OF TABLES	X
	LIST OF FIGURES	XI
	LIST OF SYMBOLS AND ABBREVIATION	XIII
	LIST OF APPENDIX	XIV
CHAPTER 1	INTRODUCTION	1
	1.1 Background	1
	1.2 Problem Statement	2
	1.3 Objectives	2
	1.4 Scope of Study	3
	1.5 Summary	4
CHAPTER 2	LITERATURE REVIEW	5
	2.1 Introduction	5
	2.2 Product Development Process	7
	2.2.1 Phase 0: planning	7
	2.2.2 Phase 1: Concept development	8

2.2.3	Phase 2: System-level design	8
2.2.4	Phase 3: Detail design	8
2.2.5	Phase 4: testing and refinement	9
2.2.6	Phase 5: Production ramp-up	9
2.3	Computer Aided Drawing (CATIA)	10
2.4	Overview of Badminton Sport	11
2.5	Overview of Shuttlecock	11
2.6	Problem Faces	12
2.7	Summary	12
CHAPTER 3	METHODOLOGY	13
3.1	Introduction	13
3.2	Flow Chart	13
3.3	Gantt Chart	15
3.4	Product Design Specification	17
3.5	Customer Requirement	18
3.6	House of Quality (HOQ)	18
3.7	Design Criteria to be Considered	20
3.8	Morphological Chart	21
3.9	Conceptual Designs	23
3.9.1	Conceptual Design 1	23
3.9.2	Conceptual Design 2	24
3.9.3	Conceptual Design 3	25
3.10	Summary	26
CHAPTER 4	DESIGN AND DEVELOPMENT	27
4.1	Introduction	27
4.2	Final Design	29
4.2.1	Reason for selection	30
4.3	Detailed Drawings and Specifications of	31

	Parts	
	4.3.1	Body 31
	4.3.2	Handle 34
	4.3.3	Container 36
	4.3.4	Wheel 38
	4.3.5	Pulley and belt 40
	4.3.6	Conveyer and collector blade 43
	4.3.7	Collector platform 44
4.4	Assembly of the Design	45
4.5	Summary	48
CHAPTER 5	RESULT AND ANALYSIS	49
5.1	Introduction	49
5.2	Result of analysis	50
	5.2.1	Finite Element Analysis (FEA) 51
	5.2.2	Displacement analysis 54
5.3	Summary	55
CHAPTER 6	CONCLUSION AND RECOMMENDATION	56
6.1	Conclusion	56
6.2	Recommendation	57
	REFERENCES	58
	APPENDIX A	60
	APPENDIX B	61
	APPENDIX C	62
	APPENDIX D	63
	APPENDIX E	64

LIST OF TABLES

NO	CONTENT	PAGE
3.1	House of Quality (HOQ)	19
3.2	Morphological Chart	21
4.1	Morphological Chart (selected design)	28

LIST OF FIGURES

NO.	CONTENT	PAGE
1.1	Product Development Process	3
2.1	Product Design and Development Phase	7
3.1	Flow Chart	14
3.2	Gantt Chart for PSM 1	15
3.3	Gantt Chart for PSM 2	16
3.4	Product Design Specification	17
3.5	Conceptual Design 1	23
3.6	Conceptual Design 2	24
3.7	Conceptual Design 3	25
4.1	Final Design	29
4.2	Designed Body	32
4.3	Slot for Wheels	32
4.4	Shaft Holder	33
4.5	Dimensions of Body	33
4.6	Designed Handle	34
4.7	User Positions During Handling the Shuttlecock Collector	34
4.8	Dimensions of the Handle	35
4.9	Designed Container	36
4.10	Dimension of the Container	37
4.11	Designed of Front Wheel	38
4.12	Designed of Back Wheel	38
4.13	Position of the Driver Pulley	39
4.14	Dimensions of Front Wheel and Back Wheel	39
4.15	Designed Pulley	40

4.16	Dimension of the Pulley	40
4.17	Design Belt	41
4.18	Designed Roller Conveyers	42
4.19	Dimension of Roller Conveyers	42
4.20	Designed Conveyer and Blade Collector	43
4.21	Dimension of Conveyer and Blade Collector.	43
4.22	Designed Collector Platform	44
4.23	Dimension of Collector Platform	44
4.24	Assembly of the Shuttlecock Collector Machine	46
4.25	Belt System	46
4.26	Orthographic View of the Shuttlecock Collector Machine	47
5.1	Position during the Analysis	50
5.2	Detail of Material	51
5.3	Force Detail on the Analysis	51
5.4	Von Mises Stress Analysis	52
5.5	Analysis of Vector Displacement	54

LIST OF SYMBOLS AND ABBREVIATION

cm	=	Centimeter
mm	=	Millimeter
N	=	Newton
Kg	=	Kilogram
CAD	=	Computer Aided Drawing
UTeM	=	Universiti Teknikal Malaysia Melaka
PSM	=	Projek Sarjana Muda
PDS	=	Product Design Specification
HOQ	=	House of Quality
FS	=	Factor of Safety
FEA	=	Finite Element Analysis

LIST OF APPENDIX

NO	CONTENT	PAGE
A	Flow Chart	60
B	Gantt Chart of PSM 1	61
C	Gantt Chart of PSM 2	62
D	Orthographic View of Product	63
E	Orthographic View of Body	64

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Shuttlecock collector machine a new invention to all badminton players today. Usually this machine used in training session this machine will help the players to collect all the shuttlecock in shortest time without wasting time and energy to move around the badminton court for collecting the shuttlecock. This machine also has provided protection to shuttlecock from damage for recycle used.

During training, a large amount of shuttlecock is fed to players. The training have to be stopped before the shuttlecocks can be gathered using a wide mop or broom. Players the need to squat down and pick up the shuttlecock and place into the container. This can be waste a time and a energy to move around the badminton court to collect all the shuttlecock. By using a mop or broom to push and gather the shuttlecock may also damage the shuttlecock.

1.2 PROBLEM STATEMENT

A few problems encountered by the badminton players when training session are waste of time and energy to move around the badminton court for collecting the shuttlecock. During training, a large amount of shuttlecock is fed to players. The training have to be stopped before the shuttlecocks can be gathered using a wide mop or broom. Players the need to squat down and pick up the shuttlecock and place the into the container. This can be waste a time and a energy to move around the badminton court to collect all the shuttlecock. By using a mop or broom to push and gather the shuttlecock may also damage the shuttlecock.

So, this invention allows the user to collect a large quantity of shuttlecocks in the shortest time without causing much damage to shuttlecock. Shuttlecock collector is considering a new product. Not many design variety can be found in the market place. Existing design shows that there lack in terms of product design and development criteria such as a ergonomic, function ability, safety, and use ability.

1.3 OBJECTIVES

The objectives of the research are:

1. To design and fabricate a working prototype for user friendly shuttlecock collector machine (for training purpose).
2. To design a shuttlecock collector machine based on product design and development process.

1.4 SCOPE OF STUDY

Apply all the criteria in the product design and development process starting from identifying customer needs up to concept testing. The outcomes will be translated into geometrical design using CAD Software then fabricate the proposed design into a full-scale working prototype. The product development process step shown in Figure 1.1.

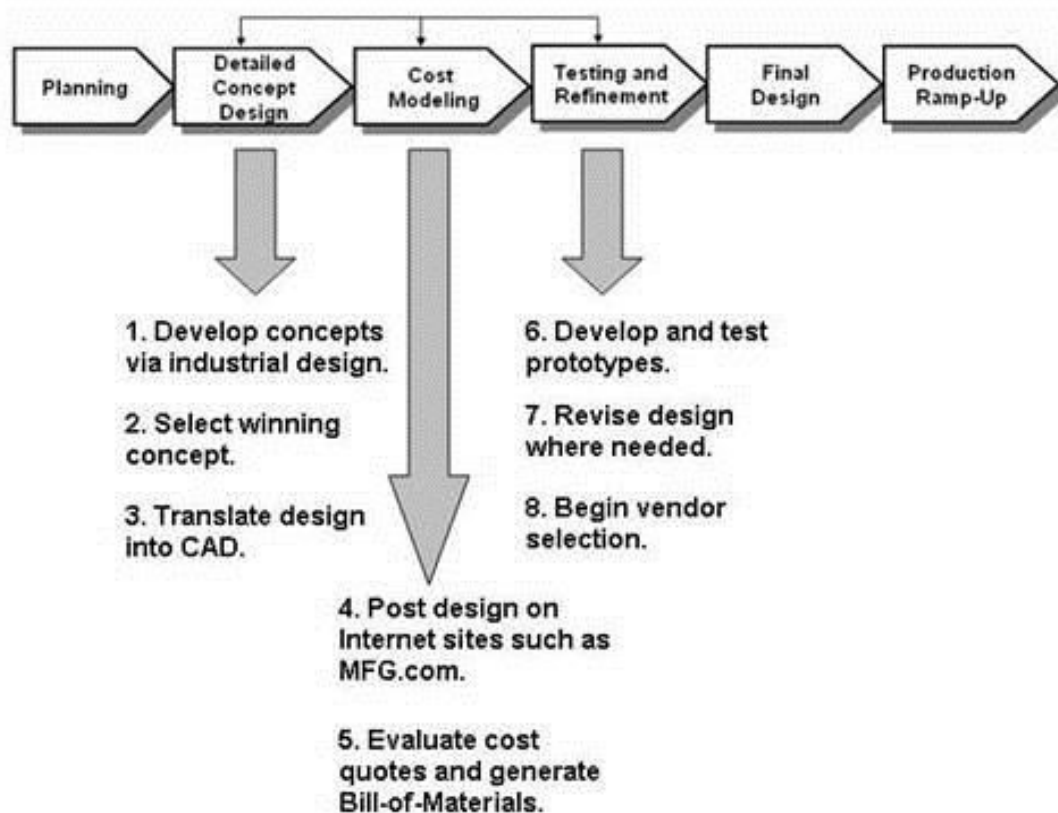


Figure 1.1: Product Development Process.

Source: Ulrich and Eppinger (2004)

1.5 SUMMARY

This chapter describe about the background of project. Then, identify the problem statement of the project. Besides that, this chapter is explaining about the objectives of the project. Lastly, this chapter is to find out on the scope of study for development shuttlecock collector machine.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Product design and development is the process of creating a new product to be sold by a business to its customers. In the document title, Design refers to those activities involved in creating the styling, look and feel of the product, deciding on the product's mechanical architecture, selecting materials and processes, and engineering the various components necessary to make the product work.

Development refers collectively to the entire process of identifying a market opportunity, creating a product to appeal to the identified market, and finally, testing, modifying and refining the product until it is ready for production. A product can be any item from a book, musical composition, or information service, to an engineered product such as a computer, hair dryer, or washing machine. This document is focused on the process of developing discrete engineered products, rather than works of art or informational products.

The task of developing outstanding new products is difficult, time-consuming, and costly. Great products are not simply designed, but instead they evolve over time through countless hours of research, analysis, design studies, engineering and prototyping efforts, and finally, testing, modifying, and re-testing until the design has been perfected.

Few products are developed by a single individual working alone. It is unlikely that one individual will have the necessary skills in marketing, industrial design, mechanical and electronic engineering, manufacturing processes and materials, tool-making, packaging design, graphic art, and project management.

Development is normally done by a project team, and the team leader draws on talent in a variety of disciplines, often from both outside and inside the company. As a general rule, the cost of a development effort is a factor of the number of people involved and the time required to nurture the initial concept into a fully-refined product. Rarely can a production-ready product be developed in less than one year, and some projects can take three to five years to complete.

The encouragement for a new product normally comes from a perceived market opportunity or from the development of a new technology. Consequently, new products are broadly categorized as either market-pull products or technology-push products. With a market-pull product, the marketing center of the company first determines that sales could be increased if a new product were designed to appeal to a particular segment of its customers.

Engineering is then asked to determine the technical feasibility of the new product idea. This interaction is reversed with a technology-push product. When a technical breakthrough opens the way for a new product, marketing then attempts to determine the idea's prospects in the marketplace. In many cases, the technology itself may not actually point to a particular product, but instead, to new capabilities and benefits that could be packaged in a variety of ways to create a number of different products.

Marketing would have the responsibility of determining how the technology should be packaged to have the greatest appeal to its customers. With either scenario, manufacturing is responsible for estimating the cost of building the prospective new product, and their estimations are used to project a selling price and estimate the potential profit for the company. Finally the product design and development phase shown at Figure 2.1.

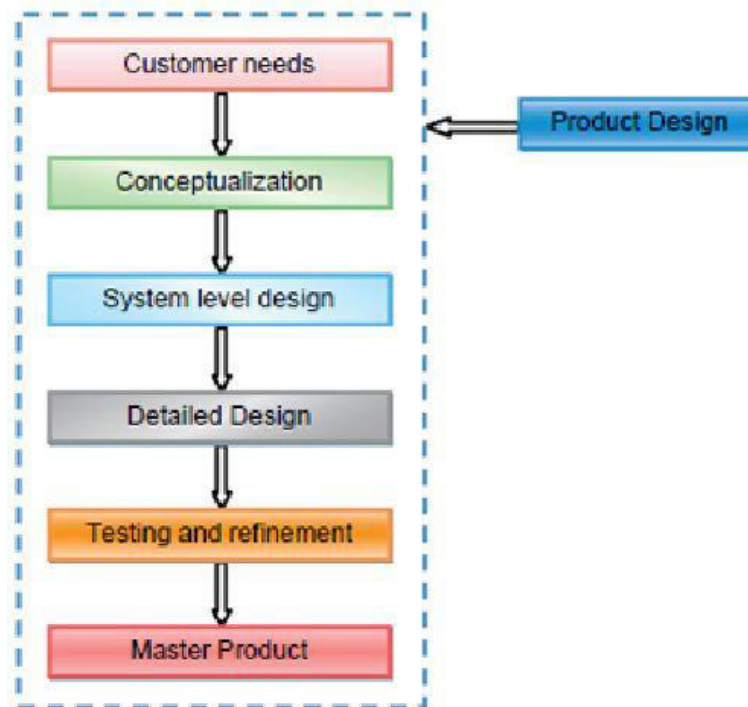


Figure 2.1: Product Design and Development Phase

Source: Ulrich and Eppinger (2004)

2.2 PRODUCT DEVELOPMENT PROCESS

The product development process consists of six phase including the tasks of each phase. The six phases of product development process are:

2.2.1 Phase 0: Planning.

The planning activity is often referred to as “phase zero” since it precedes the project approval and launch of the actual product development process. This phase begins with corporate strategy and includes assessment of technology developments and market objectives. The output of the planning phase is the project mission statement, which specifies the target market for product , business goals, key assumptions and constrain. The “product planning” will discuss more about planning phase.