



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

PRODUCT DEVELOPMENT OF BOTTLE WATER FILTER

**THIS REPORT IS SUBMITTED IN ACCORDANCE WITH THE REQUIREMENT OF
UNIVERSITI TEKNIKAL MALAYSIA MELAKA (UTeM) FOR
BACHELOR'S DEGREE OF MANUFACTURING ENGINEERING TECHNOLOGY
(PRODUCT DESIGN)
WITH HONOURS**

BY

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2015

DECLARATION

I hereby, declared this report entitled **PRODUCT DEVELOPMENT OF BOTTLE WATER FILTER** is the results of my own research except as cited in references.

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APPROVAL

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 Engineering Technology (Product Design) (Hons.). The member of the supervisory is as follow:

.....

(Project Supervisor)

ABSTRAK

Berdasarkan kejadian bencana alam yang telah berlaku di Malaysia; banjir, didapati sukar untuk mendapatkan air yang bersih. Penapis air merupakan satu alat yang digunakan untuk menapis bendasing yang terkandung di dalam air seperti bakteria dan bahan kimia yang merbahaya. Walaupun terdapat penapis air yang tersedia ada di pasaran, tetapi harganya terlalu sangat mahal. Oleh itu, objektif projek ini dilakukan adalah untuk menghasilkan satu produk yang mana dapat menapis air, selamat untuk diminum dan harganya berpatutan. Sebagai tambahan, ianya boleh juga digunakan pada botol minuman. Dalam proses pembuatan ‘_bottle water filter’ ianya melalui proses mengumpul data daripada pengguna, membuat tanda aras, dan menghasilkan idea yang baru. Sebagai kesimpulan, ‘_bottle water filter’ dapat dihasilkan untuk menangani krisis kesukaran untuk mendapatkan air yang bersih semasa didalam situasi bencana alam mahupun ketika melakukan aktiviti luar.

ABSTRACT

According to the previous natural disaster that has been occurred in Malaysia which is flood, there are difficult to find clean water. Water filter is a device that used for removing unwanted substances such as bacteria or harmful chemicals from water. Even though there are many water filter sold in the market nowadays, but the price is quite expensive. Hence, the aims for this thesis are to develop a product that can filter water, safe for drink and also have affordable price. An addition, it also can be used with the drinking bottle. In the process of make the bottle water filter, it through some process which is collecting the information from user, makes the benchmarking and generate the idea for new bottle water filter. As the result, the bottle water filter has been produce to solve the crisis to find the clean water during the natural disaster or outdoor activities.

DEDICATION

ALHAMDULILLAH.

TO MY PARENTS,

ENCIK MOHAMMED BIN LASIM

AND

PUAN ZABEDAH BINTI MARSIDI

FOR EVERYTHING.

AL-FATIHAH

ACKNOWLEDGEMENT

Firstly I would like to express my appreciation and thanks to my supervisor, Puan Nurul Ain binti Maidin, who has guided me along this whole semester. The supervision and supports from her is truly helping in the progress of my project. I had been exposed very much in product design and development which is very helpful information for this project.

The appreciation also goes to my families members. With their love and encouragement, I am strong enough to go through the obstacles come to me. Lastly, I would like to thanks all my friends who have helped me in every possible and different way to finish this project.

TABLE OF CONTENTS

ABSTRAK	i
ABSTRACT	ii
DEDICATION	iii
ACKNOWLEDGEMENT	iv
LIST OF TABLE	ix
LIST OF FIGURE	xi
LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE	xiii
CHAPTER 1: INTRODUCTION	14
1.1 Background of the Project.....	15
1.2 Problem Statement.....	16
1.3 Objectives of the Project.....	16
1.4 Scope of the Project.....	17
1.5 Organization of the Project	17
1.6 Result Expectation.....	5
CHAPTER 2: LITERATURE REVIEW	6
2.1 Floods.....	6
2.2 Water Contaminants	7
2.2.1 Parasites	8
2.2.2 Bacteria	9
2.2.3 Viruses	23
2.3 Methods of Water Treatments.....	23
2.3.1 Water Filter	24

2.3.2	Water Purifying	25
2.3.3	Carbon Block and Granular Carbon Filters	26
2.4	Filtering Material.....	27
2.4.1	Small Gravel & Big Gravel.....	28
2.4.2	Charcoal (Carbon)	29
2.4.3	Coffee Filter/Cotton Clothing	30
2.5	Chemical Used to Purify the Water.....	31
2.5.1	Potable Aqua Chlorine Dioxide	31
2.6	pH Test.....	19
2.7	Product Development for Engineering Technology.....	34
2.7.1	Phases of Generic Development.....	35
2.8	Time Compression Technologies for Engineering Technology	37
2.8.1	Rapid Prototyping (RP)	37
2.9	Used Software	38
2.9.1	SolidWorks.....	38
CHAPTER 3: METHODOLOGY		40
3.1	Method Use	40
3.1.1	Qualitative & Quantitative	40
3.1.2	Prospective & Retrospective	41
3.1.3	Ohsuga Model	29
3.2	Planning	43
3.2.1	Benchmarking	43
3.2.2	Brainstorming.....	48
3.2.3	Customer needs	49
3.2.4	Concepts.....	50

3.2.5	Detail Design.....	50
3.2.6	Testing and Refinement.....	51
3.2.7	Production.....	39
3.3	Flow chart.....	53
CHAPTER 4: RESULT AND DISCUSSION		54
4.1	Customer Needs Assessment	54
4.2	Mission Statement	49
4.3	House of Quality.....	64
4.4	Revised Needs Statement and Target Specifications	68
4.4.1	Need Statement.....	68
4.4.2	Technical Specification / Engineering Characteristic	68
4.5	External Search.....	69
4.5.1	Benchmarking of Product	69
4.6	Concept Generation	71
4.6.1	Concept Generation	71
4.6.2	Safety.....	73
4.6.3	Marketability	73
4.6.4	Initial Concept Sketches	76
4.7	Concept Selection.....	78
4.7.1	Concept Screenings	78
4.7.2	Concept Scoring	69
4.7.3	Concept Selection.....	84
4.8	Final Design	85
4.8.1	3D CAD Drawings	85
4.8.2	Explode View.....	79

4.8.3	Bill of Materials and Costs.....	93
4.8.4	Product Specification.....	94
4.8.5	Manufacturing and Assembling Process.....	94
4.9	Result	106
4.9.1	Test Result (add with drops of pH test)	106
CHAPTER 5: CONCLUSION AND RECOMMENDATION.....		107
5.1	Conclusion.....	107
5.2	Recommendation	108
REFERENCES		109
APPENDIX		113

LIST OF TABLE

2.1: Table of comparing effectiveness water treatment options	24
4.1: Table of mission statement	63
4.2: Initial Customer Needs List Obtained from Interviews and Observations	65
4.3: Hierarchal Customer Needs List	65
4.4: Example of AHP Pair wise Comparison Chart to Determine Weighting for Main Objective Categories	66
4.5: House of Quality (HOQ)	67
4.6: Table of Customer Need and Need Statement	68
4.7: Composition of the specific needs	69
4.8: Comparison Characteristic	70
4.9: Overall Design	79
4.10: Body Design	80
4.11: Cap Design	81
4.12: Filter Design	82
4.13: Scoring Classification	83
4.14: Scoring the concept	84
4.15: Table of Bill of Materials and Costs	93
4.16: Specification of bottle water filter	94
4.17: The Body Manufacturing Process	97
4.18: The Cap Manufacturing Process	99
4.19: The Filter Manufacturing Process	102
4.20: The Material inside the Filter Manufacturing Process	104
4.21: The Sticker Patch Process	105
4.22: The Final Product	105

LIST OF FIGURE

2.1: Giardia	21
2.2: Salmonella	22
2.3: Giardia	23
2.4: Simple Water Filter	24
2.5: Carbon Block Filter	26
2.6: Slow Sand Filtration	28
2.7: Charcoal	29
2.8: Coffee filter	30
2.9: Potable Aqua Chlorine Dioxide	31
2.10: Comparison of pH level	33
2.11: Phases of Generic Development	35
2.12: Example of Solidwork 3D	38
3.1: The Design Process according to Ohsuga	42
3.2: ALPS Water Filtration Unit 12 Litres	45
3.3: Coway Water Purifier Mach CHP-03A	46
3.4: Water Filter for Home Use	47
3.5: Brainstorming phases	49
3.6: Concept Development	50
3.7: Flow Chart	53
4.1: Chart of Percentage Respondents Who Love To Do Outdoor Activity	55
4.2: Chart of Percentage Respondents Having Experience/Being Victim of Natural Disaster	56

4.3: Chart of Percentage Difficult To Find Clean Water during Natural Disaster or Outdoor Activity	57
4.4: Chart of Percentage Price of Bottle Water Filter Sold In Market Is Expensive	58
4.5: Chart of Percentage This Product Can Be Commercialized in the Market	59
4.6: Chart of Percentage Will to Buy This Product	60
4.7: Chart Percentage of Price Expectation	60
4.8: Bottle Water Filter	71
4.9: Main Part (Body)	72
4.10: Cap	72
4.11: Filter	73
4.12: Categories of customer requirements	74
4.13: Design Concept 1	76
4.14: Design Concept 2	76
4.15: Design Concept 3	77
4.16: Design Concept 4 (Final Decision)	77
4.17: Cap Filter	86
4.18: Filter 2	87
4.19: Bottom Filter	88
4.20: Bottom Hollow	89
4.21: Cap Cover	90
4.22: Cap	91
4.23: Explode View	92

LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

2D	-	2 Dimension
3D	-	3 Dimension
BOM	-	Bill of Material
CAD	-	Computer Aided Design
CNC	-	Computer Numerical Control
g	-	Gram
HOQ	-	House of Quality
mm	-	millimeter
PDD	-	Product Design and Development
PVC	-	Polyvinyl Chloride
QFD	-	Quality Function Development
RM	-	Ringgit Malaysia
RP	-	Rapid Prototyping
uPVC	-	unplasticised Polivinyll Chloride

CHAPTER 1

INTRODUCTION

This chapter will cover the introduction, background of project and problem statement. From that, the conclusion will be determined based on the problem. The objectives and scope of the project are also will be explained briefly through this chapter. Besides, the objectives and scope are very important towards this project because it will give guidance through the whole process. On the other hand, with objectives and scope, it can give an overview on how to handle and conduct this project clearly.

1.1 Background of the Project

According to the previous natural disaster that has been occurred in Malaysia which is flood, there are difficult to find clean or clear water. Water filter means a device for removing unwanted substances such as bacteria or harmful chemicals from drinking water.

Even though there are many water filter sold in the market nowadays, but the price is quite expensive. Sometimes, not all people can buy this stuff due to the lack of money or they think it is not important to them.

Hence, the aims for this thesis are to develop a product that can filter water and safe for drink but with an affordable price. This product can be used for a bottle. This is because, it is easy to bring and it can be used anytime and anywhere.

There are many advantages of water filter. First, it can remove contaminants and particulates from water and ensure to receive pure, fresh and uncontaminated water. Besides, it also can protect the body from disease and leads to overall greater health. Lastly, water filters greatly improve taste and odour of drinking water by removing bacteria and chlorine from the drinking water itself.

1.2 Problem Statement

Based on previous natural disaster that happened in Malaysia (flood), there are difficult to find clean or clear water that are safe to drink. Much effort has been applied to prevent this problem. The problem statements of this project are to develop a product that can be used to filter water for a bottle. Besides, to analyse either the water is hygiene or safe for drink by using pH litmus paper. Hence, to describe the materials used for make water filter.

1.3 Objectives of the Project

Objectives are the guidance of any project. In order to make this project complete and success, these objectives must be achieved. The objectives for this project are:

- (a) To develop a product that can be used to filter water with an affordable price.
- (b) To analyse the water in order to ensure hygiene and safety of it for drink by using pH test.
- (c) To describe the material that have been used to make a water filter.

1.4 Scope of the Project

The scope for this project is to develop a product that can be used to filter water. Besides, this project covers the material that have been used to make a water filter. Other than that, it is to analyse the hygiene of water either it is safe for drink for not by using pH litmus paper. On the other hands, the work scopes for this project are:

- (a) Sketch the design of bottle water filter manually.
- (b) Design the bottle water filter by using SolidWorks.
- (c) Fabricate the bottle water filter.
- (d) Testing either the water is safe for drink by using pH test.

Before starting the design process, a feedback from users or customers are needed by distribute questionnaire or interview. The victims of natural disasters, hikers, backpackers, campers and travellers are difficult to find clean/clear or hygiene water when the situation happened. Besides, the household also can have this product as their preparation if something bad occurs.

1.5 Organization of the Project

The report will be conducted in few chapters and each of it has been stated respectively:

(a) Chapter 1: Introduction

This chapter will simply introduce about the project. This chapter contains introduction, background of project, problem statement, objectives and scope of project.

(b) Chapter 2: Literature Reviews

This chapter shows about the studies and research that relevant to the project.

(c) Chapter 3: Methodology

This section will show about the flow about the project methodology that have been used in this project.

(d) Chapter 4: Result & Discussion

This part will state out the result that have been obtained and describe the discussion of the project respectively.

(e) Chapter 6: Conclusion & Recommendation

This chapter will discuss about the summarization of the project and the major conclusion of the project. Hence the recommendation for a future use.

1.6 Result Expectation

The expectations for this project are:

- (a) The bottle filter can be functional.
- (b) The water is safe for drink.
- (c) Know deeply which material to be used.
- (d) Try to commercial this bottle water filter in the market. (Standard size of filter that can be fit for mineral water bottle for 1.5 litres and 500 ml).

CHAPTER 2

LITERATURE REVIEW

The literature on water filter is large. Several books, journal and article are available on describing the methods used for water treatments and the material use for filter the water. All the information, points, data that are related and link to this project will be discuss and attach on this chapter. Hence, it will elaborate and explain more on what is a flood, methods use for water treatments, materials that have been used, suitable pH water to drinking, water contaminants, element of Product Design and Development and software that have been used to develop this project.

2.1 Floods

Floods are one of the natural disasters that always happen in Malaysia. It is difficult to find clean water during floods. Even though water become runs out, human still need to be well-hydrated to maintain healthy. If in the desperate situation such as floods or tsunami, try to find hidden sources of water in various places at home such as water storage tank or hot water tank.

Our body weight is more than 50% water. Without water, you couldn't maintain a normal body temperature, lubricate our joints, or get rid of waste through urination, sweat, and bowel movements. Not getting enough water can lead to dehydration, which can cause muscle weakness and cramping, a lack of coordination, and an increased risk of heat exhaustion and heat stroke. In fact, water is so important that a person couldn't last more than five days without it (WebMD, LLC, 2005-2015)

Effective use of devices for providing safe drinking water are urgently needed to reduce the global burden of waterborne disease especially during floods, camps, travels or hikes. Among the water pollutants, infectious diseases caused by pathogenic bacteria, viruses, protozoa, or parasites are the most common and widespread health risk associated with drinking water.

2.2 Water Contaminants

Usually during the flood, the water will be contaminated and the water is not safe to drink. This is because; it will cause an illness such as diarrhoea, headache or vomit.

Pathogens are microscopic organisms that include protozoa, bacteria, parasitic worms, fungi and viruses. They can generally be classified into one of three broad categories; parasites, bacteria and viruses (Arthur T. Bradley, 2010)

2.2.1 Parasites



(Source: Handbook to Practical Disaster Preparedness for the Family, Arthur T.Bradley, 2010)

Figure 2.1: Giardia

Parasites include worms, lice and protozoa. All can be transmitted through water, but for modern societies, protozoa represent the greatest waterborne parasitic threat. Protozoa are single-celled organisms that may have more than one nucleus. They are generally found in water as microbial cysts and cause serious gastrointestinal illness when ingested. Fortunately, parasites of this size are large enough to be easily removed by quality water filters (Arthur T.Bradley, 2010)