UNIVERSITI TEKNIKAL MALAYSIA MELAKA

PORTABLE WATER FILTER

Thesis submitted in accordance with the partial requirements of the
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Bachelor of Manufacturing Engineering (Design Manufacturing)

By

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS TESIS*

JUDUL: **PORTABLE WATER FILTER**

SESI PENGAJIAN : **2007/2008**

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I hereby, declared this thesis entitled “Portable Water Filter” is the results of my own research except as cited in references.

Signature	:	…….
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Date	:	2 APRIL 2008

APPROVAL

This PSM submitted to the senate of UTeM and has been as partial fulfillment of the requirements for the degree of Bachelor of Manufacturing Engineering (Manufacturing Design). The members of the supervisory committee are as follow:

……

(Mr.Zulkeflee Abdullah)

(Official Stamp & Date)

ABSTRACT

Portable Water Filter is a device that helping human to get clean water at wherever their live especially to people that live an active lifestyle. So that, in this Projek Sarjana Muda (PSM) project, the new Portable Water Filter will design and develop. Even though there is several Portable Water Filter in the market, but it still some part that can be improve into a better product.

The criteria of designing and developing Portable Water Filter are depended on the needs and concept require by a customer. However, the need should be constrains with the engineering effort. But the most important thing is to understand the method used and how to generate concept in designing product especially for portable product as the purpose of this project, which is to study how to make system small and portable.

The analysis of the quality of the design are done by using design for assembly (DFA) methods which are Boothroyd Dewhurst and Lucas Hull analysis, and also SolidWorks CosmossXpress analysis. Beside that, overall of this product is using plastic as a material, so the time of injection moulding of this product is calculating by using SolidWorks MoldFlow analysis.

ABSTRAK

Penapis Air Mudah Dibawa ialah sebuah produk yang membantu manusia untuk mendapatkan bekalan air bersih dimana-mana sahaja kita berada terutamanya kepada mereka yang gemar lakukan aktiviti-aktiviti luar. Oleh itu, sebuah Penapis Air Mudah Dibawa yang baru di reka dan di bangunkan dalam Projek Sarjana Muda (PSM) ini. Walaupun terdapat beberapa Penapis Air Mudah Dibawa di pasaran, tetapi terdapat beberapa perkara yang boleh di tambahbaikkan.

Kriteria merekabentuk produk ini bergantung kepada kehendak dan konsep yang dikehendaki oleh pengguna. Tetapi, ia juga bergantung kepada kebolehan sistem kejuruteraan. Walaubagaimanapun, perkara yang terpenting ialah untuk memahami kaedah yang digunakan untuk menghasilkan konsep untuk merekabentuk produk ini sebagaimana tujuan utama projek ini ialah untuk mengkaji bagaimana untuk membuat sesuatu produk itu kecil dan mudah dibawa.

Analisis kualiti rekabentuk dilakukan dengan mengunakan beberapa analisis iaitu analisis rekabentuk untuk pemasangan (Boothroyd dan Lucas Hull) dan juga dengan menggunakan analisis dalam program SolidWorks iaitu CosmossXpress. Selain itu, jumlah masa untuk menghasilkan produk ini di kira juga dengan menggunakan program dalam SolidWorks iaitu analisis MoldFlow. Analisis ini boleh di jalankan kerana produk ini dihasilkan dengan menggunakan bahan plastik.

DEDICATION

For my dad, mum, bro and sis,
Thank you for your support in being loves me and gives me some valuable money, so that I can complete this project in time and with out any problems.

For all my beloved friends especially Farah Umaima and Ismaliza,
Your effort in helping me are can't repay with the any valuable thing.

For my PSM supervisor, Mr. Zulkeflee,
Your commitment and advice are really helping me in completing this PSM project.

ACKNOWLEDGEMENTS

All praise is to be Al-Mighty Allah S.W.T, The Merciful and Beneficent for the strength and blessing through out the entire time until completion of this PSM 1 report. Peace be upon our prophet Muhammad S.A.W, whose has given light to mankind.

I wish to express my sincere appreciation and gratitude to my PSM supervisor, Mr. Zulkeflee Abdullah for his guidance, counsels and for putting much effort through his useful advice in this PSM project.

I am also would like to thank to persons in Fakulti Kejuruteraan Pembuatan, UteM, Mr.Sivarao and other PSM community members for their effort and valuable time and also not forgotten to my head of design department, Mr.Shajahan Maidin who had shown me the big picture of my PSM project.

Lastly, for all people who involved either directly or indirectly in this PSM 1, their contribution is highly appreciated. The kindness corporation and support from all of the above mentioned people would always be remembered.

Thank you.

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INTRODUCTION

1.1 BACKGROUND

Nowadays, there are many people that realize about the importance of using clean water. Clean water will ensure healthy body. For those who are living in town area or in the clean source water area it will be no problem to get the clean water as our irrigation system has already purified the raw water before it been channel to the house. Even though, some of they still not believe the cleanness of the already processed water. They will set up a water filter system that can further reduce the value of contamination in the water. In other hands, for the others that pursue an active lifestyle such as traveling, camping, fishing and also who are those that living in the bad contaminated water area; they will face a problem to get clean water. Even they can get the water from the rainwater, snow (for a winter country), surface water in streams and lake, and also water from underground; these all have the risk of being contaminated with germs, virus and bacteria (Byron, 1997).

In this case, there are several ways to purify water, including boiling and the use of chemicals, but having a good water filter is probably the best and easiest way to obtain portable water filter. Even though there are many existing portable water filter, but it still got some problems to consumer such as heavy, large, not ergonomic, not effective and hard to use it. Some of the example portable water filters in the market are pump water filter and mineral bottle

water filter. So that, in this Projek Sarjana Muda (PSM), the new portable water filter will be design and develop where it's simpler, ergonomic, economic and comfortable, and also fulfill the consumer needs.

1.2 PROBLEM STATEMENTS

When we are in a deserted place it will be difficult to find source of clean non contaminated water especially to a people's that love to travel world wide, camping, hiking, fishing and also to the soldier and logging workers in the jungle. Even though there is several water filter system, some of these are not very effective with the condition or situation such as too heavy for a hiker to bring a pump portable water filter. Some of that are large, difficult to hold and etc. (will be discuss more in chapter 2).

There are five types of people that need a portable water filter product in get clean and uncontaminated water;

i) Those who travel worldwide.
ii) Those who pursue an active lifestyle, example; camping, fishing and etc.
iii) Those who prepare for emergencies and disasters, example; when survival is threatened by floods, fires, earthquakes, hurricanes or terrorism; they will make safe drinking water from sources such as swimming pools, flood water and toilet tanks.
iv) Those who concerned about the taste, odor and quality of their drinking water.
v) Those who live at the bad quality are such as logging workers and soldier at the jungle (Anonymous, 2007).

1.3 OBJECTIVES

The main objective of this PSM is to design and develop of an innovative living environment device, a new portable water filter. Others objectives of this portable water filter project are;

i) To study the need of a portable water filter system.
ii) To do some survey of the customer need of portable water filter.
iii) To study on how to make the system small and portable.
iv) To study a suitable design.
v) To generate and evaluate product concept.
vi) To develop prototype/ simulation of product using CAD modeling.

1.4 SCOPE

This PSM report will focus on the study of the mechanism/product design concept in designing product, Portable Water Filter. It also will include the designing and development of product, Portable Water Filter using CAD programmed. On the other hand, some aspect will not covered and discussing such as the detailed type and material of the filter.

1.5 IMPORTANCE OF THE PROJECT

The purpose of this project is to expose the product design and development concept that having in the related subject. In other hand, from the problem statement above, rational of this project are to develop and improve the product into a better portable water filter that fulfill the customer requirement and also to make sure the product that is developed are safe, cost less and easy to use.

1.6 DEFINITION OF TERMS

i) Portable

Able to be carried out or easily moved.

ii) Water Filter

A water filter is a device which removes impurities from water by means of a fine physical barrier, chemical processes and/or biological process.

iii) Contaminate

Water pollution, where contaminated are more to organic and inorganic substances such as food processing waste and chemical waste.

iv) Ergonomic

Ergonomics is the application of scientific information concerning humans to the design of objects, systems and environment for human use (*definition adopted by the International Ergonomics Association in 2007*).

1.7 ORGANIZATION OF THE REPORT

This PSM report will contains six main chapter which is Chapter 1 is introduction of the PSM project, Portable Water Filter where the topic include are objectives, project problem statement and also some of the important information about the background of the project. In the Chapter 2, the topic contain is the literature review of the existing portable water filter and others that relate with this PSM project. While in the Chapter 3, the writing is about the methodology of the project from the research until the development of the project. For Chapter 4, the result of the product design and development will be explained in details. Discussion and conclusion of this PSM project will be discussed in Chapter 5 and Chapter 6.

The time management of all activities for the PSM, Portable Water Filter project is shown in Gantt chart PSM 1 (Table 1) and Gantt chart PSM 2 (Table 2).

1.7.1 Gantt Chart

PROJECT ACTIVITIES		W 1	W 2	W 3	W 4	W 5	W 6	W 7	W 8	W 9	W 10	W 11	W 12	W 13	W 14
Project proposal	P														
	A														
Identify the need or problem	P														
	A														
Research the need or problem	P														
	A														
Develop possible solution	P														
	A														
Select the best possible solution	P														
	A														
Sketch/drawing	P														
	A														
Verification	P														
	A														
Writing report	P														
	A														

Table 1.1: Gantt chart PSM 1.

PROJECT ACTIVITIES		W 1	W 2	W 3	W 4	W 5	W 6	W 7	W 8	W 9	W 10	W 11	W 12	W 13	W 14
Design & develop product	P														
	A														
Data Analysis	P														
	A														
Result, conclusion & discussion	P														
	A														
Wrinting report	P														
	A														
Submit report & presentation	P														
	A														

Table 1.2: Gantt chart PSM 2.

1.8 SUMMARY

Through this PSM, the objectives of the project is hopefully gaining as expect which is contain the important result such as success to design new version of portable water filter and also develop a portable water filter that convenience, suitable and easy to use by the consumer. On the other hand, this chapter is providing information about the aim for the rest of the chapter.

CHAPTER 2
LITERATURE REVIEW

2.1 INTRODUCTION

In process to do a research, investigation or design a new product, literature review are very important as guidance, and it supports the act of research done. Literature review is a research or study that got from the reference sources such as journal, case study, book, and electronic media and also from the internet.

In this chapter, the topic that discuss is about the research of product needs, the existing design, and types of portable water filter. It's also included the types of filter and the importance of clean water. All of this related topic actually discussing about the objectives of this PSM project, Portable Water Filter.

Portable water filter develop as a need of consumer that wanted to drink clean water everywhere they stay especially who live an active lifestyle and also the need when there are in an emergency situation such as storm water, earthquakes and others.

2.1.1 K-chart

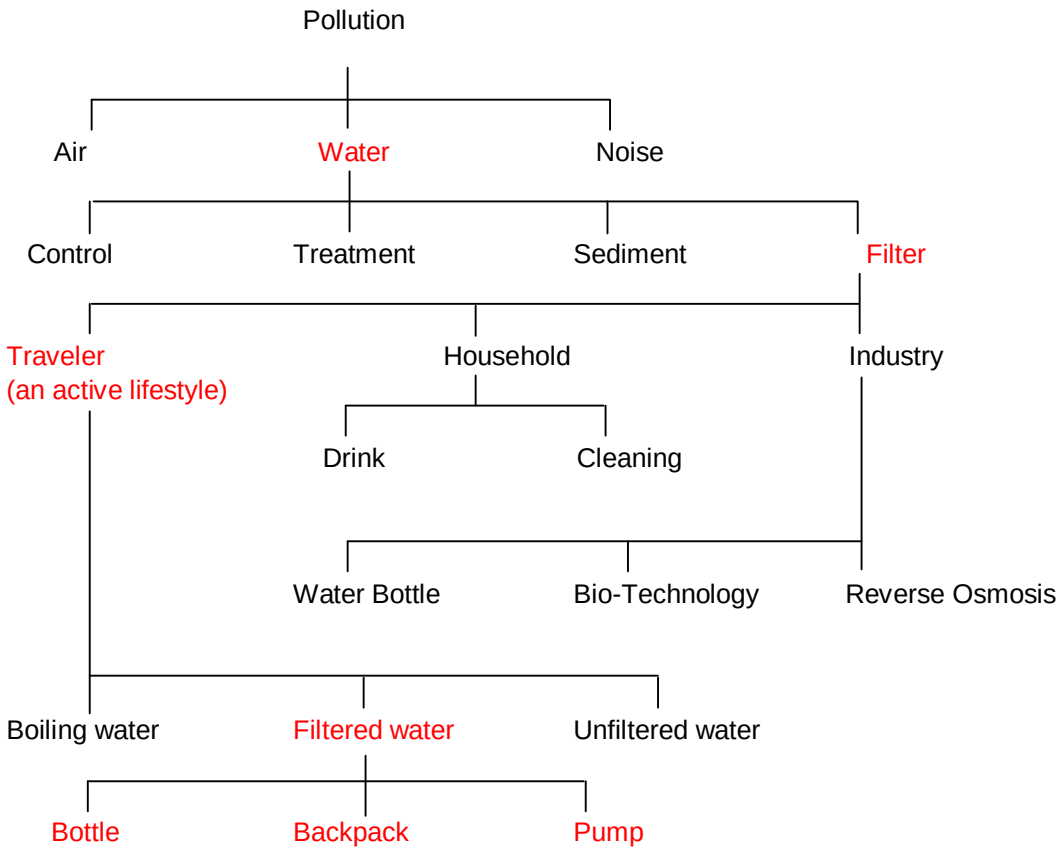

Figure 2.1: K-Chart of the PSM project, Portable Water Filter search flow. The K Chart above show the PSM project structure. The red highlighted is a scope of the PSM project, Portable Water Filter.