



**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**PRODUCT DEVELOPMENT OF SMART SOAP MAKING  
MACHINE FOR HOME APPLIANCES**

This report submitted in accordance with requirement of the Universiti Teknikal  
Malaysia Melaka (UTeM) for the Bachelor's in Manufacturing Engineering  
Technology (Product Design)(Hons)

by

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**BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA**

**TAJUK: PRODUCT DEVELOPMENT OF SMART SOAP MAKING MACHINE FOR HOME APPLIANCES**

**SESI PENGAJIAN: 2016/17 Semester 1**

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

.....

(PN. NURUL AIN BINTI MAIDIN)

## **ABSTRAK**

Mesin Membuat Sabun Automatik adalah sebuah mesin automatik untuk membuat sabun. Idea ini bermula apabila kebanyakan orang akan membuang minyak masak terpakai ke dalam sinki. Hal ini, mengakibatkan sinki tersumbat dan pencemaran air. Bahan utama untuk membuat sabun adalah minyak masak terpakai, air suam, NaOH dan wangian. Bahan-bahan ini akan digaul dalam ini Smart Soap Making machine dengan menggunakan mekanisme automatik. Objectif projek ini adalah untuk mereka bentuk sebuah Mesin Membuat Sabun Automatik, untuk fabrikasi prototaip Mesin Membuat Sabun Automatik yang berfungsi. Untuk membandingkan kaedah terbaik diantara automatik dengan manual untuk membuat sabun. Ia terbukti bahawa sabun boleh dibuat di rumah dengan menggunakan beberapa bahan dan kaedah yang mudah untuk menghasilkannya. Uji kaji dalam projek ini dilakukan diantara kaedah manual dan kaedah automatik. Masa yang diambil untuk kaedah manual untuk membuat sabun adalah 95 minit dan kaedah automatik adalah 17 minit. Ia menunjukkan bahawa automatik boleh menjimatkan masa untuk membuat sabun. Kualiti sabun juga meningkat dengan menggunakan kaedah automatik dan kuantiti yang dibuat juga meningkat daripada kaedah manual.

## ABSTRACT

Smart Soap Making Machine is an automatic machine to make soap. The idea of doing this product because of most of people will throw away used cooking oil into sink. That may result in sink clog and water pollution. The main ingredient to make soap is used cooking oil, warm water, NaOH and fragrance. It is mix in this Smart Soap Making Machine by using the automatic mechanism that is mixer. The objectives of this project are to design of a Smart Soap Making Machine, to fabricate a functional prototype of Smart Soap Making Machine and to compare the best method by automatic or manual to make soap. It is proven that soap can be made in house by using some ingredient and easy method to produce it. The testing in this project is done between make soap manually and automatically. The time for manual method to make soap is 95 minutes and automatic method is 17 minutes. It is shown that automatic can save time to make soap. The qualities of the soap also improve by using automatic method & the quantity that can be made also increase from manual method.

## **DEDICATION**

To my beloved wife, son, parents and family thank you for being supportive and for the love.



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## TABLE OF CONTENT

Abstrak	i
Abstract	ii
Dedication	iii
Acknowledgement	iv
Table of Content	v
List of Table	x
List of Figures	xi
List Abbreviations, Symbols and Nomenclatures	xiv
<b>CHAPTER 1; INTRODUCTION</b>	<b>1</b>
1.1 Background of the Project	1
1.2 Problem Statement	2
1.3 Objectives	2
1.4 Work Scopes	2
1.5 Organization of Project	3
1.6 Expected Result	3
<b>CHAPTER 2: LITERATURE REVIEW</b>	<b>4</b>
2.1 Soap	4
2.2 Soap Ingredient	7

2.2.1	Used Cooking Oil	7
2.2.2	Sodium Hydroxide (NaOH)	9
2.2.3	Scent Oil	11
2.2.4	Water	12
2.3	Soap Making	12
2.3.1	Soap Making Using Used Cooking Oil	15
2.4	Automated Machine to Make Soap from Used Cooking Oil	16
2.4.1	CAD Software	16
2.4.1.1	SolidWork	16
2.4.2	Materials and Equipment	18
2.4.2.1	Perspex	18
2.4.2.2	Strainer	20
2.4.2.3	Laminated Glass	21
2.4.3	Hand Mixer Mechanism	21
2.4.4	Rapid Prototyping	22
2.4.4.1	3D Printing	22
	Summary Literature Review	25
	<b>CHAPTER 3: METHODOLOGY</b>	<b>26</b>
3.1	Introduction	26
3.2	Flow Chart	27
3.3	Customer Need	28

3.3.1	Customer Need Statement	28
3.3.2	Survey Results	29
3.3.3	Survey Summary	35
3.4	Customer Needs	36
3.5	Revised Need Statement and Target Specifications	37
3.5.1	Need Statement	37
3.5.2	Technical Specification/Engineering Characteristic	38
3.5.3	Concept Generation	38
3.5.3.1	Main Configuration	39
3.5.3.2	Main Parts	39
3.5.3.3	Soap Drawer	39
3.5.3.4	Automatic Mechanism	40
3.5.3.5	Safety	40
3.5.3.6	Marketability	40
3.6	Concepts	42
3.6.1	Concept Selection	42
3.6.2	Initial Concept Sketching	43
3.6.3	Concept Selection	45
3.6.3.1	Concept Screening	45
3.6.4	Concept Scoring	46
3.6.5	Concept Selection	48

3.7	Final Design	48
3.7.1	Detail Design	48
3.7.2	3D CAD Drawing	49
3.7.2.1	Part Drawing	50
3.7.2.2	Assembly Drawing	58
3.7.2.3	Exploded View	60
3.7.3	Bill of Material and Cost	61
3.8	Manufacturing and Assembling Process	62
3.8.1	Material and Apparatus	62
3.8.2	Soap Drawer (Lower Body)	62
3.8.3	Main part (Upper Body)	63
3.8.4	Pipe	66
3.8.5	3D Printer	66
3.8.6	Product Specification	68
3.9	Testing	69
<b>CHAPTER 4: RESULT AND DISCUSSION</b>		<b>70</b>
4.1	Results Manual Method and Automatic Methods	70
4.1.1	Manual Method	70
4.1.2	Automatic Method	71
4.2	Comparison between Manual Method and Automatic Method	72
4.3	Limitation	75

<b>CHAPTER 5: CONCLUSION AND RECOMMENDATION</b>	<b>76</b>
5.1 Conclusion	76
5.2 Recommendation and Future Work	77
<b>REFERENCES</b>	<b>78</b>
<b>APPENDICES</b>	<b>81</b>

## LIST OF TABLES

Table 2.1	Problem in Soap Making
Table 3.1	Initial Customer Needs List Obtained from Interior and Observations
Table 3.2	Hierarchal Customer Needs List
Table 3.3	House of Quality
Table 3.4	Customer Needs and Need Statement
Table 3.5	Composition of the Specification
Table 3.6	Scoring Classification
Table 3.7	Scoring the Concept
Table 3.8	Bill of Material
Table 3.9	Details and Costing
Table 3.10	Specification of Smart Soap Making Machine to make soap from used cooking oil
Table 4.1	Result of Manual Method of Making Soap
Table 4.2	Result of Automatic
Table 4.3	Comparison Time Taken between Manual and Automatic Method

## LIST OF FIGURES

- Figure 2.1 Saponification Reaction
- Figure 2.2 Soap
- Figure 2.3 Effect of Used Cooking Oil Throw at the Sink
- Figure 2.4 Sodium Hydroxide (NaOH)
- Figure 2.5 Scent Oil
- Figure 2.6 Solidwork 2014
- Figure 2.7 Perspex
- Figure 2.8 Strainer
- Figure 2.9 Laminated Glass
- Figure 2.10 FDM Process
- Figure 2.11 Process Chain in Digital Manufacturing
- Figure 2.12 Appearance of 3D Printer
- Figure 3.1 Chart of Percentage of Respondents Know to Make Soap
- Figure 3.2 Chart of Percentage of Respondents Frequently Cooks Using Cooking Oil
- Figure 3.3 Chart of Percentage of Respondents Throw Used Cooking Oil into the Sink
- Figure 3.4 Chart of Percentage of Respondents Know a Proper Way to Dispose Used Cooking Oil
- Figure 3.5 Chart of Percentage of Respondents Aware Environment is Important
- Figure 3.6 Chart of Percentage of Respondents Know Oil can Cause Pollution



- Figure 3.7 Chart of Percentage of Respondents Agree Smart Soap Making Machine cans Save the Environment
- Figure 3.8 Chart of Percentage of Respondents Know Making Soap from Used Cooking Oil
- Figure 3.9 Chart of Percentage of Respondents Know Soap Making Process
- Figure 3.10 Chart of Percentage of Respondents Agree this Product can be commercialized
- Figure 3.11 Customer Requirements
- Figure 3.12 Concept Sketch No. 1
- Figure 3.13 Concept Sketch No. 2
- Figure 3.14 Concept Sketch No.3
- Figure 3.15 Concept Sketch No. 4
- Figure 3.16 Filter Housing and Glass Inside
- Figure 3.17 Glass B.Back and Glass B.Bottom
- Figure 3.18 Glass B.Side and Glass Bottom
- Figure 3.19 Glass FnB and Glass Side
- Figure 3.20 HM Housing (L)
- Figure 3.21 HM Housing (R)
- Figure 3.22 Mould
- Figure 3.23 Perspex Top
- Figure 3.24 HM Housing
- Figure 3.25 Smart Soap Making Machine
- Figure 3.26 Exploded View

- Figure 3.27 Smart Soap Making Machine to Make Soap from Used Cooking Oil
- Figure 4.1 the Defect of Making Soap in Manual Method
- Figure 4.2 Soap from Automatic Method
- Figure 4.3 Comparison Time Taken between Manual and Automatic Method
- Figure 4.4 Comparison Cooling Time between Manual and Automatic Method
- Figure 4.5 Comparison Ratio between Manual and Automatic Method

## LIST ABBREVIATIONS, SYMBOLS AND NOMENCLATURES

SSMM	=	Smart Soap Making Machine
NaOH	=	Sodium Hydroxide

# CHAPTER 1

## INTRODUCTION

In Malaysia, most of the time people will use cooking oil to bake, fry and other type of cooking. There are many types of cooking oil such as olive oil, palm oil, canola oil, vegetable oil and etc. There are about two or three times the oil can be used for fry. After that, the oil will throw away. The disposal of used cooking oil is an important factor for the waste-management. Most people will dump the used cooking oil in the kitchen sink. This will led to blockage to the pipe and contaminate water. Without people realise, used cooking oil can be recycled. It can be used as animal feed, directly as fuel, soap and other industrial soap. In USA, there is a bin for spent cooking oil that manages by a recycling company by mixing the used cooking oil with sodium hydroxide palette and water, can produce soap. This soap can be used to wash floor and drains. The aim for this project is to produce on automatic machine for making soap by using used cooking oil. This machine can be used in every kitchen of household are and can make soap as an alternative way to wash floor, car and drain. This can save environment.

### 1.1 Background of the Project

This project is to produce a Smart Soap Making Machine for home appliance. These projects focus on green technology because the main ingredients are used cooking oil. The used cooking oil can be converted to soap by using mixture of used cooking oil, sodium hydroxide (NaOH) pallets, water and scented oil. Sodium Hydroxide (NaOH) and palm oil is the main ingredient to make soap. Appropriate

method, technique and process will be used during development of this Smart Soap Making Machine.

## **1.2 Problem Statement**

Most of the user will throw away used cooking oil. This will cause clogged at the sink. Besides that, environment will be polluting especially water pollution. Alternative way to save this problem is to transform used cooking to soap. Additional it will operate automatically for save time and easy to use.

## **1.3 Objectives**

- i. To design a Smart Soap Making Machine
- ii. To fabricate a functional prototype of Smart Soap Making Machine.
- iii. To compare the best method (by automatic or manual) to make soap.

## **1.4 Work Scopes**

- i. Design Smart Soap Making Machine by using SolidWork.
- ii. Fabricate prototype Smart Soap Making Machine by appropriate method, technique, manufacturing process such as 3D printing, cutting and drilling.
- iii. Comparing quality of soap and production time by experimental testing Smart Soap Making Machine vs manual method.

## **1.5 Organization of the Project**

### **i. Chapter 1: Introduction**

This chapter will simply introduce about the project. This chapter contains introduction, problem statements, objectives, scopes of project and expected results.

### **ii. Chapter 2: Literature Review**

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

### **iii. Chapter 3: Methodology**

This part will show the canvas about the project methodology used in this project.

### **iv. Chapter 4: Results**

This part will state out the result that be obtained.

### **v. Chapter 5: Discussions**

This chapter will talk about the discussion of the result of the project.

### **vi. Chapter 6: Conclusion**

This chapter will discuss about the summarization of the project and the major conclusion of the project.

## **1.6 Expected Result**

- i. Development of this Smart Soap Making Machine wills success.
- ii. Target every home has one Smart Soap Making Machine.
- iii. Commercial to the related industry.

## CHAPTER 2

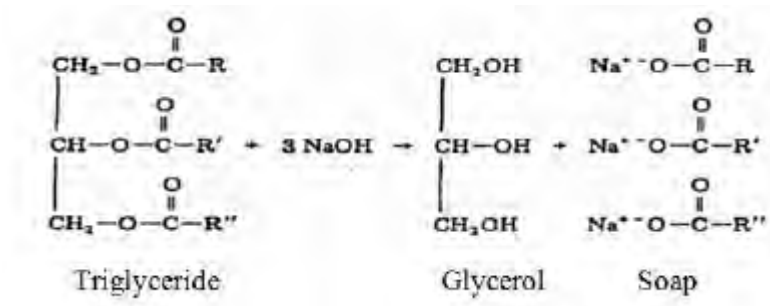
### LITERATURE REVIEW

This chapter will cover about anything that is related to make a soap, material and equipment that will use. The main ingredient to make soap is used cooking oil. It is as replacement to the oil that normally use to make soap the information that is stated in this chapter is based on the research from article, journal and any other relevant information or data that is related to the field of study.

#### 2.1 Soap

Word 'soap' originates from Latin *sapo*, which is origin from Latin sebum, tallow. Nuttall defined soap as "an alkaline or unctuous substances utilized as a part of washing and cleaning" In science, soap is a salt of an unsaturated fat. Soaps are mainly used as surfactants for washing, showering furthermore cleaning. It is perfect by going about as a surface agent active, wetting and emulsifying. Soap is the result of blending an alkaline solution with fat in specific amounts, with the right temperature, for the most part around 40.5°C to 42°C. The two most critical soluble bases which more often than not utilize are sodium hydroxide (NaOH) and potassium hydroxide (KOH). To produce soap, there are three main methods that are direct saponification of fats and oils, neutralization of fatty acids and saponification of fatty acid methyl esters (Ogoshi, T. & Miyawaki, Y., 1985). When they are combined well together specific circumstances, a chemical process changes the fat and alkali blend to a single substances, which is soap. This substance procedure is called "saponification"

Saponification is a procedure of making soap. It is made by blending rendered fat which from beef or mutton fat, with an alkaline solution. Within 24 hours 80% to 95% of the saponification is finished, over the following a few days to weeks it will proceed with this saponification process, getting to be milder and milder.



(Source: Nihad A. Alhassani1, Ali Sabri Badday Esam , A. Abdalwaheed, 2015 6th International Renewable Energy Congress (IREC))

**Figure 2.1:** Saponification Reaction

Soap was most likely found by Stone Age's lady who saw that the combined residues compound. In 600 BC, the soap made by the Phoenicians from tallow and beech powder was most likely used as hair pomade, instead of for washing. The use of soap in individual cleanliness is initially recorded in the second century when the doctor Galen mentions its use for body washing. Soap making in Europe was set up before the end of the first millennium, with critical focuses at Marseille and Savona, where olive oil was used rather than tallow.

Hundred years ago, all soap was produced from using animal fats. This was happen when animals were butchered by families who save the lard for making the soap at home. Alkali solution was used as well, typically; lye was used as the alkali solution. Lye was made from the ashes of the fireplace.

In 1916, during World War I, the primary cleanser was made because of the capacity of supplies like tallow and fat. It was an excellent opportunity for lady who needed to free themselves from depleting chore of making soaps by highlighting the relationship amongst cleanliness and wellbeing; the publicizing effort in 1950s have expanded soap popularity. In any case, in the present age, everybody turn out to be