UNIVERSITI TEKNIKAL MALAYSIA MELAKA

# UNIVERSITI TEKNIKAL MALAYSIA MELAKA

## RESEARCH ON CONCEPT IDEA OF *SEMPERIT DAHLIA* MACHINE DESIGN

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering (Manufacturing Process) (Hons.)

by

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TAJUK: **Research on Concept Idea of *Semperit Dahlia* Machine Design**

SESI PENGAJIAN: **2014/15 Semester 2**

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# APPROVAL

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# ABSTRAK

Kuih semperit merupakan salah satu kuih tradisional di Malaysia. Terdapat dua jenis bentuk kuih semperit iaitu yang pertama berbentuk bunga dahlia dan yang kedua berbentuk segi empat sama. Dalam kajian ini, kuih semperit berbentuk bunga telah dipilih. Kuih ini bukan sahaja terkenal semasa perayaan tetapi juga selalu dihidangkan ketika makan petang sebagai makanan ringan. Oleh disebabkan itu, terdapat permintaan tinggi terhadap kuih ini. Terdapat tiga objektif dalam kajian ini. Pertama adalah untuk memperbaiki masa yang digunakan semasa pemprosesan kuih semperit secara tradisional kepada kaedah mesin automatik. Objektif kedua adalah untuk mereka bentuk konsep berdasarkan produk kajian dan permintaan pelanggan. Terakhir adalah untuk membentuk perancangan proses dalam mereka bentuk mesin dengan menggunakan alat mereka bentuk. Maklumat-maklumat yang diperolehi daripada kajian soal selidik. Soal selidik telah diedarkan kepada 50 orang yang mengenali kuih ini. Maklumat yang dikumpul telah dianalisis menggunakan rajah *Quality Function Deployment* (QFD) untuk memilih kriteria teknikal yang diperlukan untuk mereka bentuk mesin. Kemudian, kaedah pemilihan konsep dilakukan untuk memilih reka bentuk terbaik. Akhirnya, reka bentuk terbaik terpilih berdasarkan produk kajian dan juga atas permintaan pelanggan.

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# ABSTRACT

*Semperit* cookies are one of the Malaysian traditional cookies. There are two shapes of *Semperit* cookie, first is flower shape and second is rectangular shape. In this report the flower shape of this cookie was selected. This cookie is not only popular during the festive season but also serve as a delightful snack during tea time. Therefore, there is a demand for *Semperit Dahlia* cookie during the normal day. There are three objectives for this research. Firstly is this study to improvise the time consumes to manufacture if *Semperit Dahlia* cookies process from traditionally to automated machine. Second is to develop the best conceptual design based on the product research and customer requirements. Lastly, to construct process design planning by applied design tools in produce *Semperit Dahlia* machine design. The data was obtained by using questionnaires. This questionnaire is distributed to 50 respondents that familiar on this type of cookie. The data was analysed by using Quality Function Deployment (QFD) diagram to select the technical characteristics of this machine design. Next, Concept Selections Methods had been used to selecting the best concept. Finally the best conceptual design was selected based on the product research and customer requirement.

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# DEDICATION

To my beloved parents, family, lecturers and friends

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# LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

| | | |
|---|---|---|
| A | - | Ampere |
| AC | - | Alternative Current |
| CAD | - | Computer Aided System |
| CIM | - | Computer Integrated Manufacturing |
| CNC | - | Computer Numerical Control |
| DC | - | Direct Current |
| Eq. | - | Equation |
| HOQ | - | House of Quality |
| HP | - | Horse Power |
| kg | - | Kilogram |
| ICG | - | Interactive Computer Graphics |
| IKS | - | *Industri Kecil dan Sederhana* |
| mm | - | millimetre |
| PLC | - | Programmable Logic Controller |
| PSM | - | *Projek Sarjana Muda* |
| QFD | - | Quality Function Deployment |
| RM | - | Ringgit Malaysia |
| V | - | Voltage |
| 2D | - | Two Dimension |
| 3D | - | Three Dimension |
| % | - | Percentage |
| Ø | - | Diameter |

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# CHAPTER 1
# INTRODUCTION

This chapter provides an introduction of the project background including several approaches on designing *Semperit Dahlia* Machine. Then, follow by problem statement, objectives, and scopes of concept idea of *Semperit Dahlia* Machine Design.

## 1.1 Background of Product

*Semperit* cookies are one of the Malaysian traditional cookies. This cookie is usually served during Malaysia celebrations such as *Hari Raya Aidilfitri* for visiting guests. This *Semperit* cookie is mixing of wheat flour, corn flour, custard powder, sugar and margarine. All the ingredients must mixed together to become a dough. Then, the dough has put into the mould of *Semperit Dahlia* cookie and press the dough by presser.

There are two shapes of *Semperit* cookies which are dahlia flower shape and rectangular shape called as *Semperit Dahlia* and *Semperit* Butter cookies respectively. On this research the flower shape was selected as the subject. Figure 1.1 was shown the image of two types of *Semperit* cookies. The dahlia flower can see in Figure 1.2.



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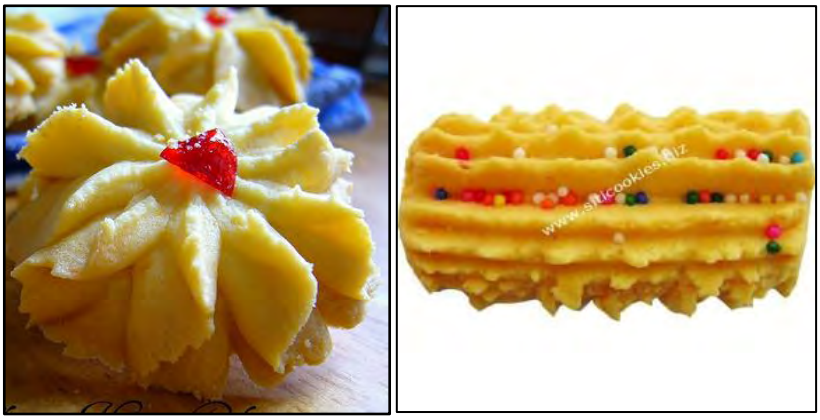

(a) (b)

Figure 1.1: (a) Flower shape (b) rectangular shape of *Semperit* Cookies

Figure 1.2: Dahlia Flower

For entrepreneurs such as *Industri Kecil dan Sederhana* (IKS), to make this cookie traditionally it take a long time to produce in larger quantity. Therefore, this report is a concept idea to create a new product that to upgrade the old product and increase added value to previous one. Which means this idea is generate from a traditional method in manufacturing of this cookie into automated machine using the current technologies. Apart from that, the automated machine can reduce of the time consuming in production this cookie and other cookies. Due to the high production of this cookie, the automated machine is one of choice to increase their production. The outcome when using on this *Semperit Dahlia* cookies machine still retains the quality of the cookies same as traditionally but the productions are double and faster.



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## 1.2 Problem Statement

*Semperit Dahlia* cookie is one of the Malaysia famous traditional. Nowadays, this cookie is not only popular during the festive season but also serve as a delightful snack during tea time. Therefore, during the normal day there is a demand for *Semperit Dahlia* cookie. Hence, this idea is to reduce the time consumes for *Semperit Dahlia* cookies production. Therefore, this study is required for determine the best design concept of a fully automated machine because it needed to reduce the time consumes and to increases the production.

## 1.3 Objective

The objectives of this study are:-

i. To improvise the time consumes to manufacture of *Semperit Dahlia* cookies process from traditionally to automated machine.
ii. To develop the best conceptual design based on the product research and customer requirement.
iii. To construct process design planning by applied design tools in produce *Semperit Dahlia* machine design.

## 1.4 Scope of Project

This scope of this study is developed the best conceptual design based on the product research and customer requirement by applying concept selection method such as screening and scoring method. Besides that set of questionnaire is conducted to receive the raw data from the respondent. This questionnaire is distributed on 50 respondents to obtain the appropriate data. Based on the data can develop the concept design and select the best design. Based on the respondents' feedback the data can be analysis by applying tools like Quality Function Deployment (QFD) and also Concept Selection Method to determine the best concept. In addition, this focus



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is on the idea and problem based on the manufacturing time lead to make the *Semperit Dahlia* Cookies. Furthermore, this product must be helpful and produce productivity and efficiency.

## 1.5 Outline of the Report

Chapter 1 is the introduction the project which includes background of the product, problem statement, objectives to be achieved and scope.

Chapter 2 is literature review of this project which consisting the detail of the research and review process to develop a *Semperit Dahlia* Cookies machine. The all information or research will be used as guidance for selection concept and innovate product with using engineering approach.

Chapter 3 is methodology of this project which explaining all process to produces the design of *Semperit Dahlia* Cookies Machine based on engineering approach by applying the tools such as questionnaire, house of quality and Pugh's method.

Chapter 4 is result and discussion which represent all the data obtained from the questionnaire, Quality Function Deployment (QFD) and Concept Selection method. The discussion part is consisted the detail of best selected machine.

Chapter 5 is conclusion and future work of this project.



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# CHAPTER 2
# LITERATURE REVIEW

This chapter explains all the detail of the research and review process to develop a *Semperit Dahlia* Cookies machine. The all information or research have used as guidance for selection concept and innovate product with using engineering approach.

## 2.1 *Semperit* Cookies

*Semperit* cookies are one of the Malaysian traditional cookies. This cookie is usually served during Malaysia celebrations such as Hari Raya Aidilfitri or Chinese New Year for visiting guests. This *Semperit Dahlia* Cookies also known as Butter Cookies among the Chinese.

The ingredient to make this cookies are butter that has softened at room temperature, icing sugar, plain flour, custard flour, corn flour, egg yolk, rose essence (or vanilla essence) and lastly broken cherries. (Royce, 2014)

There are two shapes of *Semperit* cookies which are dahlia flower shape and rectangular shape called as *Semperit Dahlia* and *Semperit* Butter cookies respectively. On this research the flower shape was selected as the subject. Figure 1.1 was shown the image of two types of *semperit* cookies. The dahlia flower can see in Figure 1.2.



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Figure 2.1: *Semperit Dahlia* Cookies Royce,2014)

## 2.2 Existing Product

Figure 2.2 below shows the figure of the existing product and the traditional mould *Samperit Dahlia* cookies. This existing product act as the reference product that is available in the market. This product are easy to operated, easy to clean and can be placed at anywhere.

Figure 2.2: Mould *Semperit* Cookies (Royce,2014)



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## 2.3 Quality Function Deployment

According to Crowson, R. (2006), a wide of variety of companies was adopted this Quality Function Deployment (QFD) as a planning a new product and comparing their product to that of their competitor product. Apart from that, QFD refers to determine the importance set of requirements for each phase of product development process planning and using that data to identify the set of technical requirement that contributes more to satisfy all the requirements.

### 2.3.1 Clarifying and Specifying Customer Needs

Gopinathan (n.d) state that clarifying customer need means that to provide an effective customer services by understanding how the customer will use a product. Customer needs are the basic requirements that are met by the product or service. In order to gain an understanding into the customer need some methods can be used such as surveys or questionnaire. This method to elicit the person's point of view and an experience that they had.

According to Tapke et al., (n.d) after determined what the customer needs are, some organization is needed to translate the customer need into particulate specification. This organization can use known data from market research, or conduct new studies if necessary.

### 2.3.2 Technical Requirements

Technical requirement is next step on QFD process. On this part is to identifying what the customer wants and what must be achieved to satisfy these wants. Once all requirements are identified by using some method, this part is important to answer what must be done to product design to fulfil the necessary requirement. (Tapke et al., n.d). Table 2.1 explains how to use a requirement table to help design process.



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Table 2.1: Requirement Table

| Requirements | What |
|---|---|
| A list of requirement from customers. | An expanded list of what need to be done to the product to fulfil the requirement. |

### 2.3.3 Planning Matrix

The planning matrix is proposed to compare how well the customer requirements compared to existing product. In this section, the important measure is Importance Weighting. Customer rating, typically ranging from 1 to 5 are given to each company under each customer requirement. (Tapke et al., n.d)

### 2.3.4 Interrelationship Matrix

This section is the main body of QFD diagram. The purpose is to translate the requirements as expressed by the customer into the technical characteristics of the product. This matrix has related to combinations of customer requirements and technical requirements. Besides that, to identify the interrelationship of these two requirements are significant. These relationships are indicated by a strong relationship, medium relationship or weak relationship. Each level has assigned a score that should understand and agree to before completing this matrix. The score could be such as 9-3-1, 4-2-1 or 5-3-1. When there is no relation between the requirements, the score can be zero. (Taple et al., n.d)



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### 2.3.5 Technical Correlation Matrix

This technical correlation matrix also called as the triangular roof matrix. This roof is used to identify where the technical requirements that characterize the product, support or impede one other. The following symbols are used to represent what type of impact each requirement has on the other. (Tapke et al.,n.d)

Table 2.2: Key to roof Symbol

| **Key to roof symbol** | |
|---|---|
| ++ | Strong Positive |
| + | Positive |
| -- | Strong Negative |
| - | Negative |

### 2.3.6 Technical Properties and Targets

This is the final section of QFD to be completed and summaries the conclusions drawn from the data contained in the entire matrix. There are three parts in this section which are technical priorities, competitive benchmarks and targets.

Technical priorities is the relative importance of each technical requirement of the product in meeting the customer's specific needs that can be simply calculated from the weightings contained in the planning and interrelationship weighting is multiplied by the Overall Weighting from the Planning Matrix. These values are then summed down the columns to give a priority score for each technical requirement. Below shows the formula of relative importance:-

$$Relative\ importance\ (\%) = \frac{Technical\ priorities}{sum\ of\ technical\ priorities}\ X\ 100\%$$ -------- (Eq. 2.1)



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