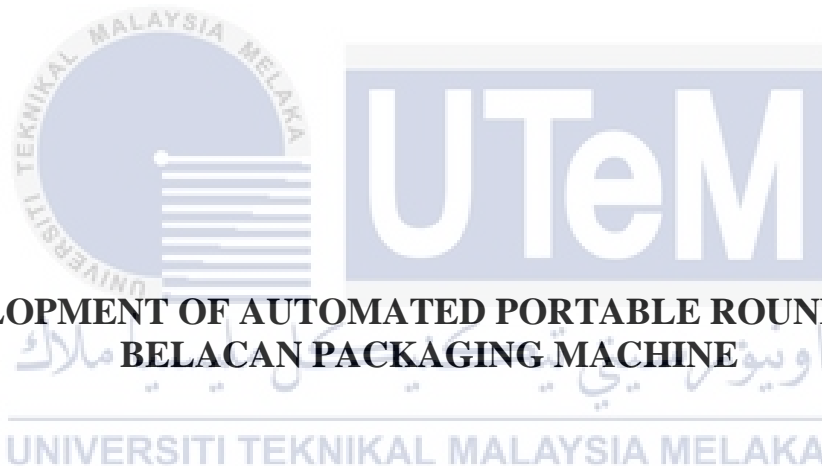




Faculty of Electrical and Electronic Engineering Technology



**DEVELOPMENT OF AUTOMATED PORTABLE ROUND SHAPE
BELACAN PACKAGING MACHINE**

MUHAMMAD ZULHILMI BIN SUMADI

**Bachelor of Electrical Engineering Technology (Industrial Automation & Robotics)
with Honours**

2021

**DEVELOPMENT OF AUTOMATED PORTABLE ROUND SHAPE BELACAN
PACKAGING MACHINE**

MUHAMMAD ZULHILMI BIN SUMADI

**A project report submitted
in partial fulfillment of the requirements for the degree of
Bachelor of Electrical Engineering Technology (Industrial Automation & Robotics)
with Honours**



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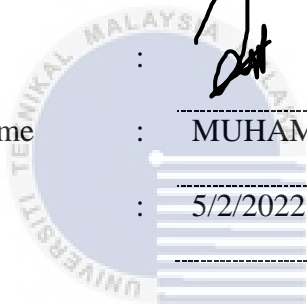
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ABSTRACT

Belacan is a food product that is widely used in Malaysia as a seasoning in cooking and can be found in various shapes and sizes. However, the process of packing belacan is hard work and very tiring. Therefore, this project proposes the development of a portable and automatic Belacan round -shaped packaging machine system that can simplify the packaging process. There are three phase of this project that are processed. Firstly, to develop mechanical system for automated portable round shape belacan packaging machine. Next, to develop control system for the machine. Lastly, is to analysis the system performance of the machine. The key component of this concept is that the engine gear is strong enough to drive the machine in a spherical shape. Other components include plumbing rods, round moulds, plumbing acid batteries, and even ultrasound equipment. The user of this machine has to place the belacan solely into a circular mould and the machine can detect the belacan placed in the mould and then the machine can create the belacan in the form of a linear movement to form the belacan. The belacan is successfully moulded into a circular and will be available for sale to clients following this process.

ABSTRAK

Belacan adalah produk makanan yang banyak digunakan di Malaysia sebagai perasa dalam memasak dan boleh didapati dalam pelbagai bentuk dan saiz. Namun, proses mengemas belacan adalah kerja keras dan sangat memenatkan. Oleh itu, projek ini mencadangkan pembangunan sistem mesin pembungkusan berbentuk bulat mudah alih dan automatik Belacan yang dapat mempermudah proses pembungkusan. Terdapat tiga fasa projek ini yang diproses. Pertama, untuk membangunkan sistem mekanikal untuk mesin pembungkus belacan bentuk bulat mudah alih automatik Seterusnya, untuk membangunkan sistem kawalan mesin. Terakhir, adalah untuk menganalisis prestasi sistem mesin. Komponen utama konsep ini adalah bahawa gear mesin cukup kuat untuk menggerakkan mesin dalam bentuk sfera. Komponen lain termasuk batang paip, acuan bulat, bateri asid paip, dan juga peralatan ultrasound. Pengguna mesin ini harus meletakkan belacan semata-mata ke dalam acuan bulat dan mesin dapat mengesan belacan yang diletakkan di dalam acuan dan kemudian mesin dapat membuat belacan dalam bentuk pergerakan linear untuk membentuk belacan. Belacan berjaya dibentuk menjadi pekeliling dan akan tersedia untuk dijual kepada pelanggan yang mengikuti proses ini.

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LIST OF SYMBOLS



LIST OF ABBREVIATIONS

V	-	Voltage
Ah	-	Ampere
mm	-	millimetres
c	-	Celcius
DPDT	-	Double Pole Double Throw



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CHAPTER 1

INTRODUCTION

1.1 Project Background

This project is to design and develop of automated portable round shape belacan packaging machine for small-scale belacan industries using linear motion mechanism by using geared motor. Because to the way of working to form a belacan into a round is very complicated and requires a high amount of labour, the belacan salespeople are unable to provide maximum sales of belacan and cannot meet the needs of customers who want to make a large quantity of belacan orders. The old way of making belacan by using hard labour is very hard and tiring to the salespeople who makes selling belacan for a living. This has caused the belacan merchants to experience losses in terms of profit and cannot fulfil customer satisfaction optimally. This portable and automatic round shape belacan packaging machine system can solve the problems of the traders who are affected by the problems they face. This machine can save time for traders to form belacan and it is able to reduce the workload of traders to form belacan and is able to simplify the way the work of the formation of belacan itself. The main component of this project is a motor gear that is strong enough and capable of driving the machine to shape the belacan into a round shape. The design and development of the automated portable round shape packaging machine will help a lot of belacan salespeople to create more income and to help them improve their sales.

1.2 Problem Statement

Among small-scale belacan industries the available method of shaping and moulding the belacan into a ball round shape is by using hand method which is very hard labour and very timid and use a lot of human force as if there were a lot of belacan order , the seller will need to work hard to finish it in order to follow through the demand of the customers. Next, this will also be the cause of too many human errors on shaping the belacan as the round shape of the belacan will not be consistent as it relies on the human labour itself and it may reduce the quality of the belacan itself. Moreover, by using human labor the quantity of productivity of the belacan making is limited to its human exhaustion labour and this will waste the number of customers that can be served.

1.3 Objective Of Research

The objective of this research are as follow:

- a) To develop mechanical system for the shaping and packaging of the round shape belacan.
- b) To develop mechanism for the portable round shape machine and the system of the machine.
- c) To analyze the performance of the system and machine.

1.4 Scope of Research

Scope of this research are outline as follow:

- a) This automated portable round shape belacan packaging machine will be easy to move because of its light weighted and portable.

- b) This machine is limited to use electrical actuator only.
- c) This machine has a simple control system in order for it easiness on using it,
- d) The analysis of the system performance is made to ensure its stability and functionality
- e) This machine is limited to only shape a round shape belacan.



CHAPTER 2

LITERATURE REVIEW

2.1 Overview

This section describes and summarizes the overall concept and the philosophy of the project for an automated portable round packaging machine. The main purpose of the chapter was to explain past and current research. This chapter explains the theory and concept used to address the challenge in this project. The main information sources include journals, articles and case studies. These sources were selected according to their relevance to the scope of the research..

2.2 Automated Portable Round Shape Belacan Packaging Machine

The available method for shaping and shaping the belacan in a ball-round form among small-scale Belacan industries uses the hand method, which is very tough and very timid and uses a lot of human force, as if there was a great deal of belacan order, the seller will have to work hard to achieve it in order for customers to meet demand. For instance, a hawker seller may get a ten-kilogram sack of belacan, which must then be split into three moulds of 200-gram, 500 gram, and one kilogram each, according to consumer demand.

In the current circumstances, it will reduce the seller's product productivity. This is because the seller must mould the belacan by hand, which takes more time and will exhaust the seller if clients desire around 100 pieces of Figure 2.1 of belacan each day. This will result in tremendous tiredness and may result in injury to the seller, as they will be required to form the belacan and their production will be limited by their stamina and willingness to mould the belacan. As a result, the profit margin on belacan sales will be reduced.

As is, the seller cannot upgrade or improve their shop to become more successful and updated in order to sell more belacan, which generates more income and simplifies their life as a seller. This increases the daily productivity of belacan and simplifies the seller's life, as well as allowing them to improve their shops in order to attract more customers to come and buy their belacan.



Figure 2.1 1 Kilogram Belacan

2.3 Machine System

2.3.1 Bath Bomb

The machine that made the bath bomb is shown at Figure 2.2 .A bath bomb is a condensed mixture of wet and dry substances that has been moulded and dried into one of several possible shapes. Bath water effervesces at the surface of a bath bomb buried in it, dispersing additives such as essential oils, moisturisers, fragrances, and colourants. The bath bomb was conceived in 1989 by Mo Constantine, co-founder of Lush Cosmetics. After becoming attracted by Alka-Seltzer tablets, Constantine began producing her bath bombs in her Dorset shed. While Mo's first attempts resembled Alka-Seltzer pills, she and husband Mark Constantine quickly experimented with a variety of moulds and substances. In 1989, the Constantine's patented the first bath bomb, dubbed 'Cosmetics To Go'. The pair,

however, lost the patent when the company went into administration. Cosmetic Warriors LTD was granted a new patent in 2014 for the process of manufacturing layered bath bombs. While the Bath Bomb Press can only press five moulds at a time Figure 2.3 is shown how you will be able to consistently manufacture rock hard bath bombs with an even form with this automatic bath bomb producing machine, There is no longer any manual labour involved in attempting to manually press them, This mould is 3" in diameter and holds approximately a 9oz bath bomb. Bath Bomb Press and moulds are constructed entirely of lightweight anodized aluminium. It takes up little space in your work area and requires little maintenance. Perfumes or scented oils contained in the bath bomb are discharged into the air together with the carbon dioxide bubbles, Wood-Black explained. The sodium from the baking soda and the remaining citric acid molecule, minus the hydrogen removed during breakdown, dissolve completely in the water. Corn-starch has no purpose other than to slow down the process of a bath bomb.

Corn-starch binds to both baking soda and citric acid, so retarding their breakdown. As a result, the fizz may last three or four minutes instead of seconds. Bath bombs receive their fizz from chemical reactions that occur when baking soda and citric acid come into contact with water. Baking soda, or sodium bicarbonate, has the chemical formula NaHCO_3 . Baking soda dissolves rapidly in water, and the sodium ion (Na^+) separates from the bicarbonate ion (HCO_3^-).



Figure 2.2 Bath Bomb Machine



Figure 2.3 Bath Bomb Mold

2.3.1.1 Type Of Bath Bomb Machine

There are numerous bath bomb press machines available, ranging from electric machines to single and double press machines capable of simultaneously processing multiple moulds, including the following:

- i) Bath Bomb with an Electric Current

Electric bath bomb presses are unquestionably the best bath bomb presses since they involve almost no effort or labour on your side; all you have to do is combine the materials

to create the proper mould, and the machine will take care of the rest. Figure 2.4 is one of the examples of electric bath bomb

The disadvantage of these bath bomb press machines is that they are somewhat expensive. When shopping for an electric press from a reputable provider, the price can easily range from a few hundred to well over a thousand dollars.

Additionally, many of these automated mould presses come equipped with their own recipes for optimising the shape of their moulds. Electric bath bomb machines include the electra press

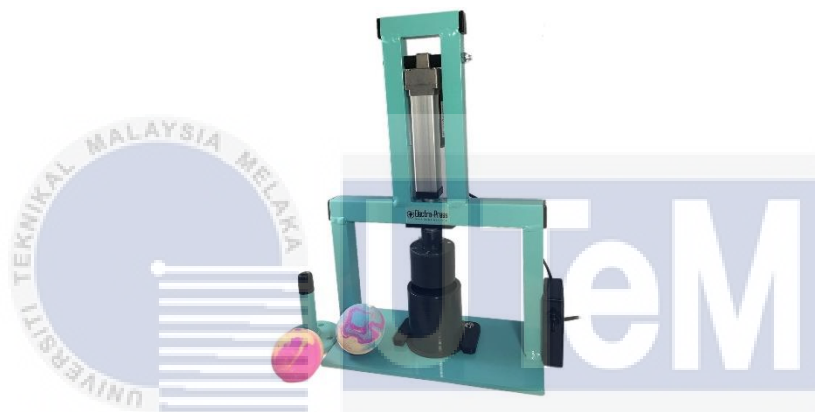


Figure 2.4 Electra Press

ii) Hand Press Bath Bomb Machine

The hand press bath bomb machine consists of presses with a rotating lever that lowers the press and creates the bath bomb. However, using these requires little effort.

Many of these are made of more affordable materials yet perform admirably well for the occasional bath bomb maker. Figure 2.5 is the example of hand press machine. Additionally, they are available in an array of designs and shapes. Although it is compact and portable, it needs considerable human labour and can become rather tiresome.