

UNIVERSITI TEKNOLOGI MARA

**DESIGN AND FABRICATION OF AN
AUTOMATIC DONUT TOPPING
MACHINE**

NURUL ATHIRAH BINTI RAMIZAN NASSIR

Dissertation submitted in partial fulfillment
of the requirements for the degree of
Diploma
(Mechanical Engineering)

College of Engineering

Feb 2025

ABSTRACT

This dissertation presents a machine designed to revolutionize the donut industry by enhancing the efficiency of the topping application process. The Donut Topping Machine aims to tackle the challenges faced by donut sellers in achieving both uniformity and speed when applying toppings. With this machine, donut shops can quickly and evenly apply toppings such as sprinkles and icing sugar. Its key feature is an automated dispenser that distributes a variety of dry toppings evenly across the surface of each donut, ensuring consistent and efficient application compared to manual methods. This innovation would save time and labor for donut shops while promoting a more uniform and rapid preparation of donuts. Additionally, the machine should have compartments that are easy to clean and maintain, making it suitable for use in a familiar kitchen environment. Market research in the donut industry shows a growing consumer demand for creative and visually appealing toppings, indicating a strong potential market for an efficient solution like this donut topping machine. The primary goal of developing this machine is to simplify the process of applying toppings individually by hand. The anticipated outcome is a machine that effectively distributes toppings as requested by customers.

ACKNOWLEDGEMENT

Firstly, I wish to thank God for giving me the opportunity to embark on my diploma and for completing this long and challenging journey successfully. My gratitude and thanks go to my supervisor, Mr. Ahmad Najmie Bin Rusli, who has been endlessly patient and helpful throughout the whole process of this project.

Finally, this dissertation is dedicated to my father and mother for the vision and determination to educate me. Also helped me financially and provided additional advice alongside useful knowledge. This piece of victory is dedicated to both of you. Alhamdulillah.

TABLE OF CONTENTS

	Page
CONFIRMATION BY SUPERVISOR	ii
AUTHOR’S DECLARATION	iii
ABSTRACT	iv
ACKNOWLEDGEMENT	v
TABLE OF CONTENTS	vi
LIST OF TABLES	viii
LIST OF FIGURES	ix
LIST OF ABBREVIATIONS	xi
CHAPTER ONE : INTRODUCTION	1
1.1 Background of Study	1
1.2 Problem Statement	2
1.3 Objectives	3
1.4 Scope of Study	3
1.5 Significance of Study	3
CHAPTER TWO : LITERATURE REVIEW	4
2.1 Benchmarking/Comparison with Available Products	4
2.2 Review of Related Manufacturing Process	6
2.3 Patent and Intellectual Properties	8
2.4 Summary of Literature	11
CHAPTER THREE : METHODOLOGY	13
3.1 Overall Process Flow	13
3.2 Detail Drawing	15
3.3 Engineering Calculation and Analysis	21
3.4 Bill of Materials and Costing	29
3.5 Fabrication Process	30

CHAPTER ONE

INTRODUCTION

1.1 Background of Study

Donuts are a well-known craving satisfier that are always in high demand, either in small businesses or big factories. Donuts are also known as one of the most wanted desserts in Malaysia and are always loved by many people. In Malaysia, even a small business donut shop could earn RM12K a month.[16]

However, the issue of hygiene in the food-making processes these days is getting hotter. For example, people these days dispute, “Why can’t these food-making processes be more hygienic, and what can we do about it?”. People are worried if there is any cross-contamination during the making process of the foods they buy because it causes bacteria or other microorganisms to unintentionally transfer from one object to another. Another question that arises among people these days is, “Are donut shop owners still paying their workers to pipe out the icing one by one with their hands?”. These questions were the main reason for the thought of making an automatic donut topping machine. A donut-making machine is widely used in Malaysia and other countries, but many are not used to a topping machine.

According to Borneo Post Online article, 5 bread and cake processing shops with poor hygiene in Bintulu, Sarawak ordered to close. The food making area or kitchen were found in unsanitary conditions. “The shops will be closed for a maximum of 14 days and will only be allowed to re-open after rectifying the cleanliness issue” said Bintulu’s Health Officer, Melvin Chung.[17]

Unfortunately, despite the beauty of piping out the donuts’ toppings by hand, there are a few problems that came up to the thoughts of buyers. The main problem is hygiene, where buyers would think of the workers’ consistency of hygiene care. There are also problems where the owners of the small business shops can be in a state where they are just beginning to engage in this business field without a big sum of capital or investable money so most probably, they can’t be affording a high paying salary for their workers. Moreover, there are buyers that want the same exact design on every