

**UNIVERSITI TEKNOLOGI MARA**

**MANUALLY OPERATED ONIONS  
GRADING MACHINE FOR THE  
AGRICULTURAL PRODUCT**

**INTAN NUR MAWADDAH BINTI MOHD SHAM**

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

**College of Engineering**

**Feb 2023**

## **ABSTRACT**

Onion grades are determined by the various onion sizes. The method of isolating onion size nowadays is quite complicated as it requires a lot of manpower at the same time. This will take more time to isolate the onions. So, this project will help more parties by reducing segregation time and the large number of manpower. This project requires only a small amount of manpower and is carried out manually only. Method of using this machine is, the user has to insert the onion into the roller and turn the lever on the side of the machine. The onion will fall down according to the size available on the loop. At the end of the process, many onions can be separated into desired grade based on their size in a short time in large quantities. The target market for this project is small industry.

## **ACKNOWLEDGEMENT**

Firstly, I would like to thank God, for letting me through all the difficulties. I have experienced your guidance day by day. You are the one who let me finish my diploma. I will keep trusting you for my future.

I would like to acknowledge and give my warmest thanks to my supervisor, Dr Kamariah binti Md Isa, and my co-supervisor, Dr Ab Aziz bin Mohd Yusof. His/her guidance and advice carried me through all the stages of writing my project. I would also like to thank my committee members for letting my defense be an enjoyable moment, and for your brilliant comments and suggestions, thanks to you,

I would also like to give special thanks to my family as a whole for their continuous support and understanding when undertaking my research and writing my project. Your prayer for me was what sustained me this far. This piece of victory is dedicated to both of my parents. Alhamdulillah.

# TABLE OF CONTENTS

<b>CONFIRMATION BY SUPERVISOR</b>	<b>ii</b>
<b>AUTHOR'S DECLARATION</b>	<b>iii</b>
<b>ABSTRACT</b>	<b>iv</b>
<b>ACKNOWLEDGEMENT</b>	<b>v</b>
<b>TABLE OF CONTENTS</b>	<b>vi</b>
<b>LIST OF TABLES</b>	<b>xx</b>
<b>LIST OF FIGURES</b>	<b>xx</b>
<b>LIST OF ABBREVIATIONS</b>	<b>xx</b>
<b>CHAPTER ONE: INTRODUCTION</b>	<b>11</b>
1.1 Background of Study	11
1.2 Problem Statement	11
1.3 Objectives	11-12
1.4 Scope of Study	12
1.5 Significance of Study	12
<b>CHAPTER TWO: LITERATURE REVIEW</b>	<b>13</b>
2.1 Benchmarking/Comparison with Available Products	13-14
2.2 Related Manufacturing Process	14-15
2.3 Sustainability/Ergonomic Related Items	15
2.4 Patent and Intellectual Properties	16
2.5 Summary of Literature	17
<b>CHAPTER THREE: METHODOLOGY</b>	<b>18</b>
3.1 Overall Process Flow	18-19
3.2 Detail Drawing	20-23
3.3 Engineering Calculation and Analysis	24-25
3.4 Bill of Material	26-27
3.5 Fabrication Process	28-34

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of Study

The onion, also known as the bulb onion or common onion, is a vegetable that belongs to the genus *Allium* and is the most extensively farmed species. The shallot is a botanical variety of the onion that was previously classified as a separate species. Garlic, scallion, leek, and chive are all close relatives. Onions are grown and utilized all over the world. They are commonly served cooked as a vegetable or as part of a prepared savory dish, but they can also be eaten raw or used to make pickles and chutneys. When sliced, they have a strong odor and contain chemicals that can irritate the eyes.

Nowadays, the process of isolating onions takes a very long time because it still uses human labor. The isolation function of this onion size is to determine the grade of the onion. This machine will rotate the onion in the chamber and will fall into the container according to the size of the onion where the size will determine the grade of the onion.

### 1.2 Problem Statement

The onion separation process used nowadays is very complicated because onions need to be separated one by one. The process also uses a lot of manpower to shorten the isolation time. It will take a long time to separate the onions completely.

### 1.3 Objectives

The main objectives of this project are:

- a) To design & analysis the manually operated onions grading machine for agricultural product working mechanism.