

# AUTOMATIC EGG GRADING MACHINE

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## UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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### PROJEK SARJANA MUDA II

**Tajuk Projek** : AUTOMATIC EGG GRADING MACHINE

**Sesi Pengajian** : 

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Speacial dedication to my beloved parents, all my siblings, my kindhearted supervisor Mr. Ahmad Nizam bin Mohd Jahari@ Johari and speacial thank to my dearest friends.

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## ABSTRACT

Eggs are the main raw material food sector in Malaysia. Conventionally, separation of eggs by its grade has been done manually which consume the slower process. An Automatic Egg Grading Machine was developed by using spinning wheel methods to overcome the conventional grading process. Eggs can be divided into seven grades, which is grade AA, A, B, C, D, E, and F. This machine is used a high-tech fibre sensors to detect the egg grading operation according to their height. The use of this sensor because this lens can maximizes the light emission efficiency, resulting in a tremendous improvement in the sensing range and the whole system is controlled by using a PIC microcontroller. The hardware is designed based on turning wheel concept. The input to the PIC is a limit switch used to initiate the movement, while the output is DC motor that will spin the wheel and stops at the respective grade position. This machine is to facilitate separation of grade eggs, accelerate the separation of eggs and reduce the use of human resources.

## ABSTRAK

Telur merupakan bahan mentah utama dalam sektor makanan di Malaysia. Secara tradisional, pengasingan telur dilaksanakan secara manual adalah perlahan dalam masa kini. Mesin Automatic Egg Grading dicipta dengan menggunakan konsep putaran roda adalah untuk mengatasi proses penggredan konvensional. Telur dikelaskan kepada 7 gred berdasarkan berat iaitu gred AA, A, B, C, D, E dan F. Mesin ini menggunakan sensor fiber yang berteknologi tinggi untuk melaksanakan operasi penggredan telur mengikut ketinggian. Penggunaan sensor ini untuk membolehkan memaksimumkan kecekapan pemancaran cahaya disamping menyebabkan suatu peningkatan dalam julat pengesanan dan keseluruhan system ini menggunakan mikropengawal PIC. Bahagian perkakasan direka berdasarkan konsep putaran roda. Bahagian masukan yang disambung kepada PIC adalah pengawal suis yang digunakan untuk mengawal pergerakan, sementara keluaran pula adalah motor arus terus yang akan memusingkan roda dan akan berhenti pada grade tertentu. Mesin ini adalah untuk memudahkan operasi pemisahan telur mengikut grade, mempercepatkan pemisahan telur mengikut grade dan bagi mengurangkan penggunaan sumber manusia.



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## LIST OF ABBREVIATION

PC	–	Personal Computer
LDR	–	Light Dependent Resistor
ADC	–	Analog to Digital Converter
LCD	–	Liquid Crystal Display
SIP	–	Single In-line Package
DIP	–	Dual Inline Package
QFP	–	Quad Flat Package
IDE	–	Integrated Development Environment
ASM	–	Assembly Language



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## CHAPTER 1

### INTRODUCTION

#### 1.1 Introduction

This project is development of PIC based on wheel rotation system. This machine is able to facilitate the separation grades of eggs, to accelerate the separation of eggs and reduce use of human resources. Nowadays, 90 % of eggs production is marketed in the local market and 10 % of its will export. The main market of export is Singapore [1]. All these eggs are packing in 'shell egg' form. Marketing of eggs partly was done by wholesaler and a small part further by retailer.

As we know, eggs can divide into 7 grades that is grade AA, A, B, C, D, E, and F. The weight of grade AA is more than 70 grams, grade A is from 65-70 grams, grade B is from 60-65 grams, grade C is from 60-55 grams, grade D is from 55-50 grams, grade E is from 50-45 grams and F is less than 45 grams [2].

In Malaysia, the percentage of production eggs in grade AA is 4%, grade A is 12%, grade B is 28%, grade C is 31%, grade D is 18% , grade E is 5% and grade F is 2% [2]. The percentage of the egg grade that is produce depends on its genetic.

A few technologies that has been introduced inside production of chicken egg such as packaging egg, grading egg, and collecting egg. This technologies use to help conserve usage of labor force and increase farm output.

## **1.2 Background issues**

Eggs are available year round to provide not only delicious meals on their own but as an essential ingredient for the many baked goods and sauces that would never be the same without them. Eggs are a good source of low-cost high-quality protein, providing 5.5 grams of protein (11.1% of the daily value for protein) in one egg for a caloric cost of only 68 calories [3].

As everyone knows, eggs are the main raw material in food sector. Separation of eggs into grade available today is manually. The egg production will slow and cannot accommodate market demand. Production of conveyor equipments for separate eggs automatically is a tool that can increase the number of eggs production which can save time.

Automatic Egg Separator is design to help farmer packing egg grade by grade. Under microcontroller control, these systems afford to separate egg according to grade A, B and C. With this system also maintenance works can be done more systematic. Apart from this also can reduce man power and in same time farmer also able to save maintenance cost. Without farmer observation, this system affords to operate by itself. When use this system, egg production can be maximized and being marketed faster depends on market demand. Cost for buying this system also reasonable.

### 1.3 Objectives :

The objectives of the project are important to ensure the research will fulfill the solution of the problem research. All the objectives are shown below:

- a) Design and develop an Automatic Egg Grading Machine prototype design using software and hardware that can separate the eggs according to grade A, B and C.
- b) Build a system that can reduce farmers work and save time in egg packaging.
- c) Building a system that easy to operate.

### 1.4 Scope of Project :

Several scopes that need to be considered in this project to make sure this project successful are:

- a) Study and research – Find more information that related with this project. The entire for this project can be divided in two sections; software and hardware design.
- b) The hardware development in this project consists of the turn table and an electrical circuit for the micro controller, fiber sensors and LCD display.
- c) The software consists of a controller circuit that are used PIC16F877A Microcontroller to control the whole system of grading machine.

## 1.5 Expected Results

Automatic Egg Grading Machine is composed of several parts, hardware and software. Turn the hardware portion of the table. All systems will be controlled by programming the integrated circuit (PIC), which has been programmed with a suitable program to control the whole system. Input to the PIC is a limit switch used to initiate the movement turn table. While the output is the direct current motor that will turn the tables turn. Eggs will fall from chicken coops to the control input quantity of eggs. In this section, the number of eggs will be controlled by DC motors which are connected with mechanical parts. Eggs will be put one by one if there are signals that the hole in the turn table is empty. The hole had to be in effect by the laser that acts as a transmitter, where the laser is transmitted through the holes into the bottom hole of the sensor that acts as receiver. If no eggs, power supply will stop and the DC motor will not work. Once the egg is then, the turntable will move back up to the fiber sensor. In this section, the sensor will detect the height of the egg by their grade. The value of grade will be displayed on the LCD screen. Once the egg is been graded, it will stop at a certain time delay and each delay grade is different. After the turn table stopped at the respective grade, the farmers will take the eggs and put every egg in their own containers.

## 1.6 Thesis outline

This final year project report consist of five chapter. Fist part which is is chapter I of this paper discusses the introduction, objectives, problem statements, scope of the project and thesis outline of an utomatic Egg Grading machine.

The second part which is Chapter II describes literature review and background study of Automatic Egg Grading machine. In this chapter also tells about components and equipment that is used in the project this.

The third part which is Chapter III covers the design and development which is methodology project of an Automatic Egg Grading Machine.

The fourth part which is Chapter IV consist of the results and application of Automatic Egg Grading Machine. It is includes the result analysis and software development.

Finally, the last part states the conclusions and recommendations are needed for help complete the project implemented.

## **CHAPTER 2**

### **LITERATURE REVIEW**

This chapter will describe the literature review which related with development of the Automatic Egg Grading Machine. It is consists of three literature review namely Innova Wide 18, Ardentia 12 and Omnia FL 500.

#### **2.1 Innova Wide 18**

##### **2.1.1 Introduction**

Diamond Automations producing machines 'Innova Wide 18' to be grading and packing eggs. This machine can pack 180,000 eggs per hour. In the washing machine can also be an egg. All eggs are in check either cracked, dirty, and every size of eggs will be in arbitration. Eggs that have been broken will be automatically removed. For eggs that are dirty, the conveyor will be returning for a second time while cleaning the eggs were cracked and separated either that egg still been use or not. Innova 18 Wide Windows ® operating system, which facilitates networking with other computers. This

enables easy management of the system is connected with the grades of Diamond, which provides the flexibility to use Microsoft ® Office. With this machine, the quality of packaging can be improved [4].Innova Wide 18 can be seen in Figure 2.1 Summary of case studies can be seen in Table 2.1



Figure2.1: Innova Wide 18

Table 2.1: Summary of Innova Wide 18

CHARACTERISTICS	INFORMATION
Number of eggs packed	180.000 eggs per hour
Software	Windows
Number of packaging line	-