



## PREFACE

Thank God, the writer prays to the presence of Allah SWT, the Lord of the universe and the ruler of everything who has given His grace and guidance and the lord of the Prophet Muhammad SAW so that the author can complete the thesis entitled "DESIGN AND FABRICATION OF A PORTABLE MINI GROUNDNUT & PEANUT SHELLING MACHINE." In completing this thesis, the author received a lot of help, guidance, and encouragement from all parties, so on this occasion, the author would like to express his deepest gratitude to:

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My father, mother, and brother always provide moral and material support.

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Friends in arms who have accompanied me, thank you for your encouragement and cooperation during the research of this final project.

Finally, the author hopes that this report can be used properly and can be useful for all of us. And the author would like to thank various parties that I cannot mention one by one who has helped me in completing the research of this final report. I hope that what I have done so far is useful for all parties. I apologize for any unwanted behavior during the execution of this final project or in typing names in this research report

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## ABSTRACT

Abstract of the project presented to the Senate of Management & Science University in partial fulfillment of the requirements for the degree of Bachelor of Science in Mechanical Engineering (Hons.).

### DESIGN AND FABRICATION OF A PORTABLE MINI GROUNDNUT & PEANUT SHELLING MACHINE

By  
**MICHAEL OLOAN PURNOMO AJI**  
June 2022

**Faculty: Information Science and Engineering**

Peanuts are one of the most popular and abundant legumes, and their uses depend on the purity of the nuts. Peanut seeds are surrounded by underground pods that are harvested by manually or mechanically pulling or lifting the plant. Normally, peanuts are simply shelled by hand. The shell was designed and developed to separate the nut from the shell. This machine project aims to design and manufacture a peanut shelling machine. The shelling machine is operated using electric DC motors which are connected to the external power supply. When power is supplied to the motors, it rotates the roller which has shell-crushing horns. Groundnuts are fed into the crushing chamber through the hopper and get crushed between the semicircular net and the roller.



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## ABSTRAK

Abstrak tesis yang dikemukakan kepada Senat Management & Science University sebagai memenuhi sebahagian keperluan untuk ijazah Bachelor Sains Mekanikal (Kepujian).

### DESIGN AND FABRICATION OF A PORTABLE MINI GROUNDNUT & PEANUT SHELLING MACHINE

By  
**MICHAEL OLOAN PURNOMO AJI**  
June 2022

**Fakulti: Sains Maklumat dan Kejuruteraan**

Kacang tanah adalah salah satu kekacang yang paling popular dan banyak, dan penggunaannya bergantung pada ketulenan kacang. Biji kacang tanah dikelilingi oleh buah bawah tanah yang dituai dengan menarik atau mengangkat tumbuhan secara manual atau mekanikal. Biasanya, kacang tanah hanya dikupas dengan tangan. Cangkerang direka bentuk dan dibangunkan untuk memisahkan kacang daripada cangkerang. Projek mesin ini bertujuan untuk mereka bentuk dan mengeluarkan mesin tempurung kacang. Mesin peluru dikendalikan menggunakan motor DC elektrik yang disambungkan kepada bekalan kuasa luaran. Apabila kuasa dibekalkan kepada motor, ia memutar penggelek yang mempunyai tanduk penghancur cangkerang. Kacang tanah dimasukkan ke dalam ruang penghancur melalui corong dan dihancurkan di antara jaring separuh bulatan dan penggelek.



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## CHAPTER I

### INTRODUCTION

#### 1.1 PROJECT BACKGROUND

Peanuts are an agricultural product with high economic value and a source of protein in the diet of Indonesian people. Demand for peanuts is increasing year by year due to population growth, regional nutritional needs, food diversification, and the capacity of Indonesia's feed and food industry. However, domestic peanut production is inadequate to meet Indonesia's needs and still requires import substitution from abroad. Therefore, the government continues to increase production through strengthening, acreage expansion, and the use of appropriate fertilizers.

Peanuts have high economic value and play a major role in meeting the needs of legumes. Peanuts with 25-30% protein, 40-50% protein, 12% carbohydrates, and vitamin B1 rank second only to soy plants in terms of dietary supplements. Benefits of peanuts in the industrial sector include the production of margarine, soap, cooking oil, and more.

The function of peanuts is known to have a lot of vegetable protein, iron, vitamin B complex, calcium, and vitamin K. In addition to their delicious taste, peanuts are also popular because of their functions for body health, including preventing heart disease, preventing tuberculosis, and lowering cholesterol levels in the body.

Increased production can be achieved not only by using high-yielding varieties but also by improving technical crops such as plant care, proper fertilization, and drainage systems. One of the declines in peanut production may be due to the inability of the gynophore to penetrate the soil and the gynophore not forming a pod.

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The national production of Indonesian peanuts in 2010 was 779,228 tons. Production decreased to 691,289 tons in 2011 and increased to 709,061 tons in 2012. However, the increase in production could not meet domestic demand. This can be seen from the fact that the import value of peanuts in 2012 was as large as 125,636 tons.

Peanuts have advantages over other legumes such as high yields, stable yields, resistance to major diseases (rust and leaf spot), and drought tolerance. However, the resulting product is still low due to several factors, one of which is weeds. Peanut production in 2013 amounted to 11,351 tons, which decreased by 723 tons compared to peanut production in 2012. Peanut production in 2014 was 10,113 tons, which decreased by 1,238 tons compared to production in 2013.

West Java peanut production in 2014 reached 959,972 tons with a harvested area of 143,117 ha with a productivity level of 67.08 kW/ha and in 2015 increased by 1,250,168 tons harvested from an area of 202,885 ha with a planting area of 61.79 ha. Meanwhile, in 2016 peanut production reached 1,267,351 tons with a harvested area of 295,289 ha. This increase was due to the peanut harvested area increasing from 143,117 hectares in 2014 to 206,885 hectares in 2015.

## 1.2 PROBLEM STATEMENT

Peanuts are the sixth most important oilseed in the world and belong to the legume family. Peeling is a basic step in peanut processing and can be done manually or mechanically. The manual peeling process is labor-intensive, time-consuming, and tedious. There are many peanut peeling machines on the market, but they are large, expensive, and unsuitable for home applications. Ideal for industrial applications that require mass production. Therefore, it is important to design and manufacture a portable peanut sheller for home use.



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In the farmer's view, the manual method using hands is very easy, simple, and costs nothing at all. However, it requires a lot of people in the process and takes quite a long time. Meanwhile, the method of using the machine is very difficult, meaning that when the operation of the tool is in progress or the process of peeling peanuts, the tool turns off or jams. So, farmers are confused in dealing with the problem so the process of stripping peanuts is not continued. To repair the tool of course required costs. Another factor, the government's non-farmer-friendly fuel oil policy (BBM), is characterized by continued rising prices for gasoline and diesel. This greatly affects farmers by increasing operational costs. As a result, farmers prefer the manual method using hands even though the process of peeling peanuts is very long rather than using machines but costs a lot of money. The advantages of this peanut peeler machine are the power released by the machine is small, the system works automatically and the time used for the peeling process is faster.

### 1.3 OBJECTIVE OF THE PROJECT

The objectives of the project are:

- 1.3.1 To design and fabricate a portable mini groundnut sheller machine for domestic application.
- 1.3.2 To analyze the working capacity of a portable mini groundnut sheller machine using a DC motor.

### 1.4 SCOPE OF THE PROJECT

The scopes of the project are:

- 1.4.1 The machine operates on an electric DC motor connected to an external power source.



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1.4.2 When the motor is powered, it spins a roller with a shell breaker horn.

1.4.3 Peanuts are fed into the crushing chamber through a hopper and crushed between a semi-circular net and a roller.

## 1.5 SIGNIFICANCE OF THE PROJECT

To provide farmers to have an easier way in the process of peeling peanuts. With this prototype, the farmers may reduce the intensive labor, time taken, and tiresome. This project also can help farmers and small entrepreneurs to reduce the cost of employing manpower with effective power usage, because it's smaller in size, less cost, and suitable for domestic applications. The money saved by implementing this machine can be used for other purposes to improve their business or to cover other expenses.

## 1.6 LIMITATION OF THE PROJECT

The household must have an electric current for the external power supply. This is compulsory, because the prototype needs electricity to run and rotates the roller to crush the groundnuts, but had overcome this problem by implementing battery used dc motors. Therefore, the installation of this system in any household is easy and workable without problems as it will run as programmed. With all these features implemented throughout this prototype, it can be operated where ever we want.



## CHAPTER V

### CONCLUSION AND RECOMMENDATION

Peanuts are one of the most stressful legumes and their uses depend on the purity of the nuts. Peanut seeds are surrounded by underground pods that are harvested by manually or mechanically pulling or lifting the plant. Peanuts are usually easily removed from the shell by hand using a manual method. The shell was designed and developed to separate the nut from the shell. This machine project aims to design and manufacture a peanut shelling machine.

The machine operates on an electric DC motor connected to an external power source. When the motor is powered, it spins a roller with a shell breaker horn. Peanuts are introduced into the crushing chamber through a hopper and crushed between a semi-circular net and rollers.

Increasing peanuts per process to increase capacity and implementing battery-powered DC motors for future development may be upgraded by the development of the mechanism and improve the efficiency of the mechanism. Therefore, the system works programmatically, making it easy and hassle-free to install in any home. All of these features are implemented in this prototype so you can get it where you want it. Finally, I would like to thank my supervisors Madam Nurul Hamizah Binti Mohamed, Sir Muhammad Isyraf Bin Aznam, and my parents and friends for encouraging and guiding me to the completion of the project.

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