# UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DESIGN & DEVELOPMENT OF CORN PLANTING TOOL A SEMI AUTOMATIC TUGAL

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering (ROBOTICS AND AUTOMATION) (Hons.)

by

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2013

# UNIVERSITI TEKNIKAL MALAYSIA MELAKA

## BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: **DESIGN AND DEVELOPMENT OF CORN PLANTING TOOL:A SEMI AUTOMATICTUGAL**

SESI PENGAJIAN: 2012/13 Semester 2

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2013

# DECLARATION

I hereby, declared this report entitled "Design & Development of Corn Planting Tool: A Semi Automatic Tugal" is the results of my own research except as cited in references.

Signature : …….

Author's Name : Shafiyah Abd. Rashid

Date : 27th May 2013

# APPROVAL

This report is submitted to the Faculty of Manufacturing Engineering of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Manufacturing Engineering (Robotics and Automation) (Hons.). The member of the supervisory committee is as follow:

…….....

(Dr. Fairul Azni B. Jafar)

# DEDICATION

*For my beloved parents and family.*

# ABSTRAK

Projek ini adalah memberi tumpuan kepada rekabentuk dan pembangunan alat yang mampu membantu para petani secara khususnya di bidang pertanian kecil-kecilan. Harga sesebuah mesin yang terlampau mahal adalah tidak mampu untuk para petani negara memilikinya. Walaupun, disebalik harga yang mahal mampu memberikan keuntungan yang lumayan dan berlipat kali ganda kepada para petani dari segi hasil tuaian dan untung jualan. Oleh itu, projek ini mampu menciptakan satu inovasi baru kepada para petani yang masih menggunakan alat tradisional iaitu 'tugal'.Ini kerana, penggunaan tugal boleh menyebabkan masalah sakit belakang pada masa akan datang. Selain memberikan kurang keuntungan kerana penggunaannya yang kurang efektif. Hasil dari semua kajian yang dijalankan, satu inovasi baru iaitu mesin menanam biji benih jagung telah dihasilkan. Perisian CES Edupack 2010 digunakan untuk mengkaji bahan terbaik yang boleh digunakan sebagai bahan utama prototaip iaitu aluminium. Aluminium dipilih berdasarkan ciri-ciri yang telah diperincikan. Perincian pemilihan adalah berdasarkan fungsi utama setiap alat yang digunakan. Selain itu, lima lakaran rekabentuk turut dilakar dan lakaran terbaik diambil dan dilukis menggunakan perisian Catia dan SolidWorks. Setelah selesai, carta aliran proses pembuatan dibuat berdasarkan jenis mesin yang bakal digunakan. Projek ini memerlukan penggunaan mesin pelarik, mesin menggerudi dan mesin CNC.

# ABSTRACT

This project is focused on the design and development of tools that could help the farmers in particular in the field of small-scale agriculture. Prices of a machine is too high and expensive for the farmer to have it as their own. Although, the high price could provide a good income many times to the farmers in terms of yield and profit sales, if they used machine. Therefore, this project is able to create a new innovation to the farmers who still use the traditional tools of 'tugal'. This is because, the use tugal can cause back pain problems in the future. Besides that, it give less profit of income to farmer because of this method is less effective. The results from all the studies have been conducted, a new innovation of corn planting machine have been produced. Selection material will involves seeking the best match between the property profiles of the materials and that required by the design and using the CES Edupack 2010 software. Materials will be screening and ranking by using the CES Edupack 2010 software. After the materials have been, the final material choice is aluminium. Aluminium selected based on characteristics that have been discussed. Average selection is based on the main functions of each instrument used. Moreover, the sketching of idea generation is the most important things too to the research product. There are three option designs have been selected and it's have three concept of design that will apply to seed sowing. By using Catia software, SolidWorks, and the hand sketch will be applied in order to realize the design. After all result have been collected, the best result will be selected and proceed to the next process. Then, the flow chart of manufacturing process have been done based on the type of machine to be used. This project requires the use of lathe machines, drilling machines and CNC machine.

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# ACKNOWLEDGEMENT

Alhamdulillah. All praises to Allah SWT, whom with His willing giving me the strengths and passion to complete this Final Year Project which is title Design & Development of corn planting tool: A semi automatictugal. This final year project report was prepared for University Teknikal Malaysia Melaka (UTeM), basically for student in final year to complete the undergraduate program that leads to the degree of Bachelor of Engineering in Manufacturing. This report is based on the format specification that have given by the university.

First of all, I would like thanks to my supervisor of Project Sarjana Muda Dr Fairul Ani that had given valuable information, and guidance in the compilation and complete this final year project report. He not only provides me valuable knowledge but also his own private times to help us overtake any difficulty during the study. His invaluable help of constructive comments and suggestions throughout the experimental and thesis works have contributed to the success of this research.

Then, I would like to appreciate my family especially to my younger brother who teaches me in using Solidwork and answered all the doubts and uncertainties in using that software. Not forget also to my parents that always support me in financially. Thank you for give me a moral supportwithout knowing the meaning of tiredness.

Deepest thanks and appreciation to my special mate of mine, and others for their cooperation, encouragement, constructive suggestion and full of support for the report completion, from the beginning till the end. Also thanks to all of my friends and everyone, that have been contributed by supporting my work and help myself during the final year project progress till it is fully completed. Thanks for the friendship and memories.

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| | | |
|---|---|---|
| Al | - | Aluminium |
| M | | Metal |
| Arc | | Arcylic |
| % | | Percentage |
| ° | | Degree |

# APPENDICES

A Gantt Chart For Final Year Project

# CHAPTER 1
# INTRODUCTION

This chapter introduces the problem statements, the objectives, the scopes and the report structure.

## 1.1 Background

Humans need food in their daily life to continue life's continuity. Their main source of food is from areas of agriculture and animal husbandry. Areas of agriculture produce various types of fruits and vegetables. While areas of animal husbandry produce various types of source of protein like cattle, goat, chicken and also fish. In Malaysia, areas of agriculture are carried out on a large scale, small and medium. Small and medium agricultural industry category mostly use traditional crop method and equipment which is also too fundamental. Normally, crop yield in this category have annual turnover that does not exceed RM25 million and employ full-time staff which does not exceed 150 persons.

Today, agricultural industry has grown up as technology widely applied in the industry, especially in the seed sowing process. Majority of farmers used the traditional method to planting the seeds. They have to bend their body to put the seeds into the hole. This may cause them to get a backbone injury in a long term. Besides that, it takes time to complete the work at a time and the manpower is required with high skills to planting the seeds. Sometimes, it requires two persons in seed sowing process. One person will have to make the hole while the other will have to put the seeds inside the hole. Therefore, after the problems have been

identified, an idea to help the farmer in agricultural have been proposed, namely the Seed Sowing. Seed Sowing is completely fabricated to help farmers during the sowing process. This project is proposed to upgrade the traditional method with simple method. There will be a rod with seeds inside the rod. Farmers only have to press the handle to push the seeds out into the hole. Therefore, the workers do not have to bend their body anymore. They can just stand up straight to planting the seeds without having the backache and in the same time, the time taken will be reduced and also with the manpower required will be less.

## 1.2 Problem Statement

Machine is an important agricultural tool to make the cultivation easier to the farmer. Before the late eighteenth century, farmers tilled their soil with “tugal” or hoe to plant their corn crop by hand. By using “tugal” system, farmers have to bend their body in seed sowing process that may cause backache to the farmers in long a term. Besides that, it takes time for them to complete the process at a time. In addition, this process also requires high skills worker to get used with the work as it involved a bulk of output. Sometimes, it needs two persons in seed sowing process whereone person makes the hole while the other will have to put the seeds inside the hole.

## 1.3 Objectives

The objectives of this project are :

i. To develop tool that can be used in corn plantation in small and moderate industry.
ii. To analyzes the performances of develop tool.

## 1.4 Scope

The scopes of this report are designing and developing seed sowing that:

i. Control the quantity of maize that out during the sowing process.
ii. Minimize the hand motion and at the same time shorten the time taken to complete the seed sowing process.

## 1.5 Organization

This report is organized as follows:

Chapter 1 introduce the background of the agriculture, the problem statements, the objectives of the report, the scopes and the report structure for overview the whole chapters in the report.

Chapter 2 consists of a literature review which are describing about the related principle of valve, current knowledge about existing machine that relate in agricultureand about "tugal" and it's weakness.

Chapter 3 describes on the methodology including the overall flow chart and also Gantt chart for the planning of the project. This chapter also discusses and describes about the flow process of this research and also analysis about the principles of methods. In this part, the material process selection, design conceptual, analysis of design, design process of ideal generation, fabrication and performance test are discussed.

Chapter 4 focus on performance test, questionnaire, fabrication step by step from beginning process to make a develop tool until the prototype form, and generate the design of concept by using SolidWorks 2011.

Chapter 5 summarizes about the conclusion based on the experiment that will be conducted either successful and the objectives were achieved or not. Other than that, the improvement for the future work of this project will cover on this chapter.

# CHAPTER 2
## LITERATURE REVIEW

This report is focused on current knowledge about existing machine that relate in agriculture and about "tugal" and also it's weaknesses. The section of this report will explain on automation in agriculture (section 2.2), corn seed sowing (section 2.3), advantage of seed sowing (section 2.4), and summary (section 2.5).

### 2.1 Introduction

The agriculture sector is the most important sector for developing countries like Malaysia. Agriculture, is the plantation of crops to sustain life. In fact it is one of the most important features that differentiate status between developing countries and developed countries. This sector also have contributed to the foundation of the Malaysian economy. Agricultural Mechanization or mechanization in agriculture can be defined as the use of agricultural machinery is to replace manpower in whole or in part to carry out the production, storage and processing of agricultural products. This concept covers all aspects of the construction, distribution and operation of equipment, machinery also used to enable the farm operation done quickly, easily and effectively. The machinery normally require human assistance at operating level. Agricultural mechanization is not limited to the use of a tractor or motor equipment alone, even now it is also considered as the process of repair and modernize the operations and structure of the farm. In the past, agricultural mechanization system is quite limited and the lack of mechanization in agriculture technology resulted in farm tasks problems from different aspects. This leads to the agriculture industry requires a lot of labor because of the lack of agricultural mechanization technology.

Nevertheless, many workers have migrated to the industrial sector due to the opportunities provided more and more comfortable working environment. This situation resulted in an increasingly volatile agriculture industry labor shortage and cause agricultural mechanization began considered important in the agriculture industry.

Planting tool is a tool used to plant seeds in accordance with the depth and the amount of seed required. Cropping tool will be adapted to the soil conditions and the type of seed planted. Each plant will have a specification tool itself. There are several type of machine tools and planters can be classified based on energy or energy sources :

a. tool planter with human resources.
b. tool planter with animal energy.
c. device tractor planter with energy resources.

In general, the basic principle that the work of planting tools are the same, whether both types are driven or towed by human, animal or tractor. There are several prinsiples:

a. opening the groove or hole.
b. seed dropping mechanism.
c. closure of the groove or hole.

In the past, the agricultural sector is not equipped with sophisticated and modern equipment but only use traditional tools only. But now, at the insistence and the importance of agriculture has led to the use of agricultural machinery in the sector. Agricultural mechanization has been used in process or plant production activities. These activities can be divided into several groups:

a. clearing
b. soil preparation for planting
c. sowing seeds