UNIVERSITI TEKNOLOGI MARA

DESIGN, ANALYSIS, AND FABRICATION OF MECHANICAL RICE WASHING MACHINE

SCHUFEE AMANI BIN SUHAIME

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

College of Engineering

March 2022

ABSTRACT

A mechanical rice washing machine is a newly developed product according to the food processing health requirements and market demand. Due to the difficulties in keeping the rice clean manually, this project aims to fabricate a mechanical rice washing machine to clean the rice and consume less energy. A mechanical rice washing machine is a machine that can speed up the process of washing rice, and it is powered by a direct current motor because it is more efficient and makes better use of its input energy. This project intends to design, analyse, and fabricate a rice washing machine that consumes less power, water, and time than washing the rice manually. In conclusion, this eco-friendly rice washing machine will benefit the lower-income family and the college student at an affordable price.

ACKNOWLEDGEMENT

First and foremost, I am very grateful to the almighty ALLAH SWT for letting me finish my Final Year Project 2 and giving me the strength to fulfil my duty as a Mechanical Engineering student.

Firstly, I would like to take this opportunity to express my gratitude to my supervisor, Dr. Azizul Hakim bin Samsudin for his guidance, advice, valuable suggestion, encouragement, and moral support throughout the completion of this project. A million thanks to him for being so nice, patient, and kind in dealing with my queries and problems during this semester and giving me lots of information while implementing this research.

High appreciation and deepest gratitude to Ts. Dr. Ab Aziz bin Mohd Yusof, Dr. Wan Syahmi bin Wan Fauzi, Dr. Kamariah binti Md Isa, Ir. Ts. Haszeme bin Abu Kasim, and Sir Ahmad Najmie bin Rusli as my lecturer in the faculty of Mechanical Engineering, for giving advice and supporting me throughout this study work and trust me in producing this dissertation.

The completion of this dissertation could not be possible without the participation and assistance of so many people whose names may not all be enumerated. Their contributions are sincerely appreciated and gratefully acknowledged.

Most importantly, I would like to acknowledge with gratitude the support and love of my family-my parents, Suhaime and Rozaini, my siblings, Schubrian, Iskandar, and Hazim, for encouraging me to finish this dissertation. They all keep me going, and this dissertation would not be possible without them. My gratitude to them cannot be expressed in words. To them, I own my wonderful today and a dream-filled tomorrow.

Finally, I would like to thank all the people who are directly and indirectly involved in carrying out this Final Year Project 2. This experience is very valuable for me as well as adding to my knowledge of Mechanical studies that I learned throughout my study of this diploma. With this, a dissertation is produced for the Final Year Project 2 as proof that I am carrying out my project sincerely and for future reference.

TABLE OF CONTENTS

CHAPTER ONE
INTRODUCTION

1.1   Background of Study

Today's era is digitalised and automated with great speed, so people want everything very efficiently and intelligently. Washing rice before cooking is basically to remove dust and any remaining bran produced by the milling process [1]. As before, everyone washes their rice manually using their hands which slows down the process of cooking rice. Washing rice manually takes time to make the rice really clean and takes a lot of energy to mix the rice with water so that it is clean. Furthermore, it will also use a lot of water for a few rice grains, leading to massive waste.

Statistical analysis indicated that the washing procedure does not significantly affect either hardness or stickiness of cooked rice, but the interaction between rice variety and washing times on stickiness is significant [1]. "The electric rice cooker is a massive industry. A large number of the electric rice cooker produced each year potentially has a considerable impact on the environment" [2]. Therefore, this project aims to track these necessities and fulfil the most suitable product: a mechanical rice washing machine for small volume.

1.2   Problem Statement

a)   Due to chemical treatment to preserve it for an extended period of time, improper washing of rice can cause many health problems. According to the Codex Alimentarius Commission (CAC), "food safety is the assurance that food will not cause harm to the consumer when it is prepared and eaten according to its intended use" [3].

b)   Washing rice properly is the first step in preparing tasty rice. The conventional method is still used by many people today, which is using their hands. As a result, the rice will need to be washed several times before cooking. Most of the time, when washing rice or rinsing it, the water is not entirely removed, leading to dirty water on the rice.