



**BUSITEMA
UNIVERSITY**
Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF CHEMICAL AND PROCESS ENGINEERING

DESIGN AND CONSTRUCTION OF A MOTORISED

RICE HUSK-CHAR BRIQUETTING MACHINE

BY

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**A FINAL PROJECT SUBMITTED TO THE DEPARTMENT OF CHEMICAL AND
PROCESS ENGINEERING IN PARTIAL FULFILLMENT OF THE REQUIREMENT
FOR THE AWARD OF THE BACHELOR OF SCIENCE IN AGRO-PROCESSING
ENGINEERING OF BUSITEMA UNIVERSITY**

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DECLARATION

I KAYONGO JOHN PAUL proclaim that the work in this project proposal entitled “Design and Construction of Motorized Rice Husk Char Briquetting Machine” is a record of my own research work. The information derived from the literature has been duly acknowledged in the text and a list of references provided. No part of this project proposal was previously presented for another degree or diploma at this or any other institution.

SIGNATURE:

DATE:

ABSTRACT

The decreasing availability of fuel wood, coupled with the ever-rising prices of charcoal, kerosene and cooking gas in Uganda draws attention to consider alternative sources of energy for both domestic and industrial applications in the country. The selected agro-processing waste was the rice husk. It is the outermost part of the rice seed which is a hard layer and a waste material from rice milling. Rice husk includes biomass that can be exploited for various requirements such as industrial raw materials as well as energy sources or fuel but only a small group of people use it.

This research was conducted to develop a motorized rice husk-char briquetting machine as a useful waste management scheme that will sustainably reuse and recycle of the rice husk waste while generating energy. This research was conducted utilizing the rice husk as an alternative fuel by making it as a charcoal briquette. To make the treatment easy, firstly the rice husk biomass was converted into charcoal powder by carbonization method using the open-type rice husk carbonizer model.

Using SolidWorks CAD software, a linear stress analysis on the designed and sized machine components was performed and the permissible loads they would withstand at normal working conditions were determined. From the static stress graphs, it was observed that the simulated components passed the tests successfully with respect to their construction materials since the components' maximum stresses were less than the respective material yield strengths, so they would not fail under the external loading. Furthermore, for the safety factor, it was clear from the stress graphs that all the graphs had the blue color, without red portions which was a good indication that the respective materials were fit to be used for the machine construction. Therefore, there is no need for the machine design to be modified and the factor of safety to be increased.

The process of making briquettes is prepared by adding cassava starch of 6% concentration by weight as charcoal adhesive and then compacted using the designed and fabricated prototype.

The prototype economic analysis showed that the briquetting machine had a salvage value of 473,271 UGX after a working period of 3 years and a payback period of 4 months.

APPROVAL

This is to endorse that all the information in this proposal report has been compiled by KAYONGO JOHN PAUL entailing detailed records of my own research work. This report is to be submitted for examination as a partial prerequisite for the award of the degree of Bachelor of Science in Agro-processing Engineering and under the supervision of;

Mr. KAVUMA CHRIS

Signature:

Date:

Mr. SHAFFIC SSENKIMBA

Signature:

Date:

ACKNOWLEDGEMENT

I take this opportunity to concede the almighty God for He has granted me life, good health and ability to research and gather information that is incorporated in this report.

I tender my authentic thankfulness to my lovely parents for the work well done in nurturing me into a responsible and hardworking person, I thank them for their assiduous patronage in the various aspects of my life most especially the academic aspect. May God bless you copiously.

I proffer my sincere indebtedness to my dear supervisors Mr. KAVUMA CHRIS and Mr. SHAFFIC SSENKIMBA for all the time, support, guidance, knowledge and advice that you readily provided me during the preparation of this proposal, may the Almighty God bless you abundantly. More thanks extend to the entire staff of Chemical and Process Engineering department and the entire university at large.

Lastly but not least, I outspread my gratitude to my fellow students in the Agro-processing class, for your sustained support and cooperation.

DEDICATION

I consecrate this report to my parents Mr. MUSOKE JAMES and Mrs. NAKUYA JUSTINE for their interminable exertions and endeavors towards my education.

I dedicate this report to my family members, friends and all people who have helped me in one way or the other.

May God grant you noteworthy godsend upon your lives.

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LIST OF ACRONYMS

GHG - Green House Gases

RHC - Rice Husk Char

ERC - Eastern Rice Company

FEA - Finite Element Analysis

CAD - Computer Aided Design