FACULTY OF ENGINEERING.

DEPARTMENT OF CHEMICAL AND PROCESS ENGINEERING

FINAL YEAR PROJECT REPORT.

Name: Sensuwa Enock.

Reg.no: BU/UG/2017/87

Tel: 0703-725 761/0779-394 659

Email: ekays1304@gmail.com

DESIGN, CONSTRUCTION AND TESTING OF A NOVEL ROUND-THE CLOCK SOLAR-CROP DRYER WITH WATER RECOVERY.

Part 5: INDUSTRIAL DESIGN OF THE DRYER.

OTHER MEMBERS

Name	Reg. No	Part/expertise	Contact
Ms. Akankwatsa Adella	BU/UG/2017/115	Solar thermal system and PV system	akankwatsaadella1@gmail.com
Ms. Nalumansi Doreen	BU/UP/2017/167	Drying chamber	dnalumansi2@gmail.com
Mr. Kakooza Ibrahim	BU/UG/2017/22	Refrigeration system	ibrahimhassanmurad4446@gmail.com
Ms. Akimanzi Gloria	BU/UG/2017/6	Air circulation system	akimanzig@gmail.com

Supervisors

Principal supervisor: Prof. Kant Kanyarusoke

Co-supervisor: Mr. Shaffic Ssenyimba

This report is submitted to the department of chemical and process engineering of Busitema University in partial fulfillment of the award of a Bachelor of Science in agro-processing engineering.

Abstract

Final year project is a prerequisite for the award of a Bachelor's degree at Busitema University. The study about design, construction and testing of a round the clock solar crop dryer and water recovery was conducted by a group of five APE students under close supervision of Prof Kant Kanyarusoke. The study herein focuses on the industrial design of the system.

Industrial design is a creative activity that uses results of recent research to complete the design of the shape, function and structure of industrial products. For solar crop dryers unfortunately, their industrial design has been neglected resulting into poor aesthetics and poor ergonomics. Previous designers have only concentrated on functionality other than appearance and interaction with the operators. Aesthetics is a branch of philosophy that deals with a sensory perception of how products appear before others. It's the philosophy behind a pleasing outlook. Ergonomics on the other hand is a scientific discipline that is concerned with understanding the interaction between human and other elements of the whole system.

This study therefore, seeks to ease interaction of the system with operators by addressing challenges of poor aesthetics and poor ergonomics. Studies were made on movability and cornering, right materials were selected for the construction of the dryer and for construction of the support frame. Right dimensions of materials were arrived at by performing simulation analyses using Solidworks 2020. A steering mechanism, cages to protect the intellectual property in the system and a door were designed, and the whole system was manufactured. Finishing operations such as grinding, covering current carrying cables using conduits and painting were employed in this study for ergonomics and aesthetics respectively. Finally the system was installed at the selected site.

The designed dryer is easy to move from one place to another and needs an initial force of 150 N to set it into motion and a sustained force of 100N to sustain it in motion. Its dead weight is 250kg and it carries a maximum load of 150kg. It has a pleasing appearance. However, the whole system has no controls and its recommended that the system be automated to regulate temperatures, speeds of the fans and the water collection point should be made funnel-like so that water has no possibility of flowing into the fans. It should be made using a transparent material to monitor the level of water. Also, security personnel should be deployed to keep guard of the site especially during night hours and during holidays when students are off-campus because the selected site is near a road which is used by both students and residents of the surrounding villages and is on the out-skirts of the compound.

Key words: industrial design, aesthetics, ergonomics.

ekays1304@gmail.com BU/UG/2017/87

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With utmost gratitude, I want to thank my mother for supporting me through thick and thin, for being my shoulder to cry on and for training me into who I have become today. I can't thank you enough lovely generous mother. I want to thank Prof Kant Kanyarusoke for training and supervising me and for allowing me be part of his team. I thank you so much Professor. I want to thank Mr. Ssenyimba Shaffic for accepting to be my supervisor and for sharing with me his knowledge. I thank you so much. I want to thank the Busitema university workshop staff for mentoring me during my time at Busitema University. I want to thank all my teachers at previous levels for training me, allow me to thank in a special way Mr. Balinda Brian for paying my high school fees, Ms. Kayongo Annette for being my God mother and guardian since the time I met her in 2012. Having grown up in your hands under your guidance and support has been a blessing from which my children, grandchildren and great grandchildren will harvest.

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Above all, I want thank God for the far he has brought me and for the far he is taking me. He has given me life and you. I thank him.

Dear all, without you, without God, I would not have come this far. I'm delighted to thank you.

May God bless you.

ekays1304@gmail.com BU/UG/2017/87

Dedication

I dedicate this work to my mother; Ms. Nabukenya Margret, my brothers and sisters, my friends, to my mentors (teachers and lecturers) and to whoever has ever supported me in any ways during my academic struggles.

ekays1304@gmail.com BU/UG/2017/87

Declaration

I Enock Sensuwa declare that the work contained in this document is a report on the work I personally got involved in during development of our final year project under close supervision of Prof Kant Kanyarusoke. This work has never been submitted to any academic institutions for any awards whatsoever.

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Date ……/…../2022

Supervisors

Principal: Prof Kant E Kanyarusoke

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Date……../…./2022

Co-supervisor: Mr. Ssenyimba Shaffic.

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Date ……/…../2022.

ekays1304@gmail.com BU/UG/2017/87

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ekays1304@gmail.com BU/UG/2017/87