

**BUSITEMA UNIVERSITY.**  
**FACULTY OF ENGINEERING**  
**DEPARTMENT OF TEXTILE AND GINNING ENGINEERING**

**FINAL YEAR PROJECT REPORT.**

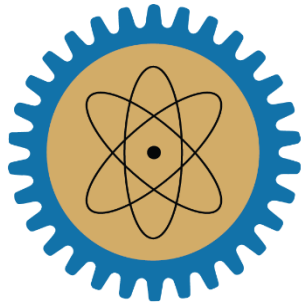
**FABRICATION AND DETERMINATION OF MECHANICAL  
PROPERTIES OF SISAL/PINEAPPLE REINFORCED UN  
SATURATED POLYESTER HYBRID BIO-COMPOSITE FOR  
AUTOMOBILE APPLICATION.**

**By**

**AKATUKWASA ABERT**

**“This report is submitted to the Department of Textile and Ginning  
engineering in partial fulfillment of the requirement for the award of the  
Degree of Bachelor of Science in Textile engineering of Busitema University”**

**DECEMBER 2020**



**BUSITEMA  
UNIVERSITY**  
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**FINAL YEAR PROJECT REPORT**

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SATURATED POLYESTER HYBRID BIO-COMPOSITE FOR  
AUTOMOBILE APPLICATION**

**By**

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**December 2020**

## Abstract

Natural fibers have received a lot of attention as possible alternative replacement for synthetic fibers, as reinforcement of various resins for advanced applications due to their properties, such as: low density, low weight, high specific strength and they are renewable, sustainable, and eco-friendly

In this work, hybrid bio-composite for automobile application derived from an unsaturated polyester matrix reinforced with sisal and pineapple fibers was fabricated using hand lay-up techniques to replace high synthetic fiber reinforced composite. Light weight components lead to low fuel consumption. The fibers surface was chemically treated by alkaline sodium hydroxide for removing impurities and improving the interphase bonding between fiber and matrix. The properties of the treated and untreated fibers were determined and treated fibers were found to have high tensile strength compared to untreated fibers. Samples with different sisal/pineapple fiber blend ratios of 100/0, 70/30, 50/50, 30/70 respectively were prepared at 30% and 25% fiber weight fraction and their mechanical properties were determined according to ASTM standards. It was found that fiber blend ratio of 50/50 has the highest tensile strength and young's modulus both at 30% and 25% fiber weight fraction.

**Declaration**

I AKATUKWASA ABERT declare that this final year project research work in this report was done by me and has never been presented to any institution of higher education for the award of any degree.

Date .....

Signature.....

**Approval**

I submit my final year project report titled FABRICATION AND DETERMINATION OF MECHANICAL PROPERTIES OF SISAL/ PINEAPPLE REINFORCED UNSATURATED POLYESTER HYBRID BIO-COMPOSITE FOR AUTOMOBILE APPLICATION to the department of textile and ginning engineering with approval of the following people

Supervisor: Ms. TUSIIMIRE YVONNE

Date.....

Signature.....

Co-supervisor: Mr. TUMUSIIME GODIAS

Date.....

Signature.....

### **Dedication**

A special feeling of gratitude to my loving parents, Mr. and Mrs. KABAGAMBE ASAPH and for their words of encouragement, spiritual and financial support.

I also dedicate this research to my brothers, sisters, aunt VARNICE and many friends who have supported me throughout the process. I will always appreciate all they have done.

### Acknowledgement

I would like to express my special thanks of gratitude to my supervisors Ms. TUSIIMIRE YVONNE and Mr. TUMUSIIME GODIAS for their continuous support of my research, for their motivation, enthusiasm, advice and immense knowledge. Their guidance helped me in all the time of research and writing of this report. I am really thankful to them

Secondly, I would also like to thank my parents who provided all financial support that helped me a lot in finalizing this project within the limited time frame.

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### Abbreviations/Acronyms

SF- sisal fiber

PF-pineapple fiber

Wf- fiber weight fraction

Wm- matrix weight fraction.

$W_c$  – weight of the composite

$w_f$ - weight of the fibers

$w_m$ - weight of the matrix

PALF-pineapple leaf fiber