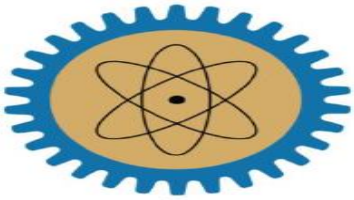

FACULTY OF ENGINEERING

DEPARTMENT OF TEXTILE AND GINNING ENGINEERING

FINAL YEAR PROJECT

PREDICTION OF TEAR STRENGTH OF A PLAIN-WOVEN FABRIC USING RESPONSE SURFACE METHODOLOGY.

BY

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ABSTRACT

Woven fabrics have been developed over the centuries to meet a wide range of requirements and end uses. They are increasingly being used in apparel, home interiors and in many technical applications such as industrial textiles, geotextiles, protective clothing and so many others. One of the most important characteristics of woven fabrics is strength which can be measured in form of tensile, tearing or bursting strength. However, tear strength is one of the most important assessment criteria of fabrics whose end uses require long service hence significant importance has to be associated with it since it is often used to directly assess the serviceability of the fabric.

Quality control is usually carried out in form of standard tests to ensure that these fabrics meet the required value of tear strength specified by the consumer before they are released from the company. Many samples are manufactured to carry out the tear strength test and in case the fabric does not meet the requirements, the parameters have to be varied and the whole process is repeated over and over again until the requirements are met. This leads to wastage of material, time and increase in the production costs.

Some studies of statistical models for predicting tear strength of woven fabrics have been conducted for example the use of computational and Taguchi techniques among others. Response surface methodology however can be used as an alternative technique for modelling the relationship between process inputs and output factors to predict responses and to optimize the process input factors. But so many factors are related to the fabric strength like yarn count, twist, fiber fineness, GSM, stiffness, yarn density, blend ratio, fabric structure, cover, yarn density, no. of layer, tightness factor and so on. It is very complex to establish a mathematical relation to determine strength considering all these parameters. This paper will concentrate on yarn count and yarn density (picks per inch and ends per inch).

DECLARATION

I NAMUYIGA ANNE JOSEPHINE, confirm that the work presented in this research project is my own, and where information was got from another source, it has been indicated in the report.

Signature …….

Date ……..

APPROVAL

This report has been submitted for examination with approval from the following supervisors.

MAIN SUPERVISOR

Mr. Tigawalana Dan

Date: ……..

Signature: ……..

CO-SUPERVISOR

Dr. Nibikora Ildephonse

Date: ……..

Signature: ……..

DEDICATION

I dedicate this research to my parents, Mr. Mulindwa Joseph Nkolo and Mrs. Mulindwa Sarah who have been a strong pillar in my entire academic journey.

ACKNOWLEGEMENT

First and foremost, I would like to thank the Almighty God who has kept me alive and safe up to this moment.

Secondly, I thank my dear supervisors, Mr. Tigawalana Dan and Dr. Nibikora Ildephonse for the endless support they have rendered to me throughout this research work. May the Almighty God reward you abundantly.

I also thank Mr. Oketcho Joseph and Ms. Aron Proscovia of the Quality Control Department at Nyanza Textile Limited for the support rendered during the carrying out of this research work.

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LIST OF ABBREVIATIONS / ACRONYMS

RSM: Response surface methodology

CCD: Central Composite Design

BBD: Box-Behnken Design

GSM: Grams per square meter

ANOVA: Analysis of variance

ASTM : American Society of Testing and Materials