BUSITEMA UNIVERSITY

FACULTY OF ENGINEERING

DEPARTMENT OF TEXTILE AND GINNING ENGINEERING

FINAL YEAR PROJECT REPORT

MODELING ROTOR SPUN YARN STRENGTH USING POLYNOMIAL NEURAL NETWORKS

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DECLARATION

I, MWESIGYE BARNABAS, Registration Number BU/UG/2011/109 hereby declare that this project is my original work except where explicit citation has been made and that this project has not been presented to any institution of higher learning for any academic award.

Signature: .....

Date: 28/05/2015.....

APPROVAL

I certify that the project entitled "MODELING ROTOR SPURN YARN STRENGTH USING POLYNOMIAL NUERAL NETWORKS" has been drafted under my supervision and is submitted to the board of examiners with my approval.

Signature……

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Date…28-5-2015

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I thank my parents in addition who helped me with finances. I bless them too in the hands of the almighty God that they may keep up the spirit of developing this country to greater heights through educating mine brothers still in the struggle of success through education.

ABSTRACT

This report shows details of the steps which were taken, for execution, findings, and recommendations of the project "**modeling rotor spun yarn strength using polynomial neural networks**".

Polynomial Neural Networks (PPN) basically group method of data handling (GMDH) that was presented here as an intelligent algorithm to predict breaking strength of rotor spun yarns based on rotor parameters and opening roller parameters as one of the most important parameters in spinning line.

Twenty nine samples were produced on the Autocoro 312 open end rotor spinning machine in NYTIL and different models (PNN and Linear regression) were evaluated. Prediction performance of the PPN was compared with that of linear regression using correlation coefficient (R^2-Value) parameters on test data. The results showed a better capability of the PNN model in comparison to the linear regression model. The R^2-values of PNN model and linear regression was 97.33% and 26.63 respectively; which means desirable predictive power of PPN algorithm.

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LIST OF ACRONYMS

PNN----------Polynomial Neural Networks

ANN----------Artificial Neural Networks

GMDH----------Group Method of Data Handling

GA----------Genetic Algorithm

PI----------performance index

SSE----------sum of squares due to errors

PD----------Partial Description

GEP----------Gene Expression

ET----------Expression Trees

MLR----------Multiple Linear Regressions

ANN----------Artificial neural networks

MSE----------Mean Square Error

RMSE----------Root Mean Square Error

RD----------Rotor diameter,

RS----------rotor speed,

ORS----------opening roller speed

Rpm----------Revolutions per minute

CHAPTER ONE

1. BACKGROUND

During yarn spinning, textile experts commonly control a number of parameters like the fiber Strength, the fiber length, the twist of yarn, the yarn count, and the fineness. Strength parameters of yarns are especially important for rotor-spun yarns since these parameters are principle components of yarn quality. More in detail a very important parameter to control is the ***yarn strength***; which is defined as the breaking force of a spinning yarn and it is recognized as one of the most important quality parameters of yarn because the number of yarn breakages in spinning, weaving and knitting processes largely depend on it. **(T. Jackowski, B. Chylewska, D. Cyniak)**

Predicting the strength of spun yarns is very important from a technological point of view. Yarn engineering, a long-cherished goal consistently sought by every spinner, implies the production of yarns according to consumer needs. Furthermore, yarn engineering provides information about the practical understanding of the generation of the strength of spun yarns. **(Anindya Ghosh)**

1.1 BREIF OVER VIEW OF ROTOR SPINNING

Among the range of open-end spinning technologies, rotor spinning is commercially, the more widely used because; a wider range of yarn counts can be spun with appropriate yarn properties. Since its commercial introduction in 1969, rotor spinning has developed continuously. Rotor speeds have increased from around 30,000 rpm to over 150,000 rpm. **(P.R. Lord, et al 2003)**

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