

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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A Project Report Submitted to the Department of Textile and Ginning Engineering in Partial
Fulfillment of the Requirement for the Award of a Bachelor's Degree in textile Engineering of
Busitema University

MAY 2015

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.

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Date: 28/05/2015

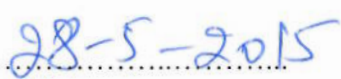


APPROVAL

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..........

ACKNOWLEDGEMENT

Special thanks go to my supervisor; Dr. Ildephonse Nibikora, for his dedication in directing me towards achieving great success of this project. The pieces of advice he gave to me as regards the project and the invested time while reading through my project work. And I pray that the almighty may bless him abundantly and to more than their expectations.

Another vote of thanks goes to the staff and management of NYTIL, mostly staff first for allowing me to carry out my experimentation from their firm. And furthermore I thank the open end rotor spinning machine technician Mr. Wako for giving me help with concerns of production and access to the machine and may God reward him abundantly.

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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