BUSITEMA UNIVERSITY

FACULTY OF ENGINEERING

DEPARTMENT OF TEXTILE AND GINNING ENGINEERING

FINAL YEAR PROJECT

TITLE: "STUDY ON THE PROCESS PARAMETERS ON THE ROTOR SPUN YARN USING GENE EXPRESSION PROGRAMMING"

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A PROJECT REPORT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE IN BARCHELOR OF SCIENCE IN TEXTILE ENGINEERING OF BUSITEMA UNIVERSITY

MAY, 2014

DECLARATION

This declaration is to clarify that all of the submitted contents of this project are original in its figure, excluding those which have been admitted specifically in the references. All the work process involved is from my own idea and creativity. All contents of this project have been submitted as a part of partial fulfillment for the award of a degree of Bachelor of Science in Textile Engineering of Busitema University. I hereby declare that this project is the work of my own excluded for the referenced document and summaries.

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Approval

This project report has been submitted under the following Supervisors.

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ABSTRACT

The report details the steps for execution, findings, and recommendations of the project fore-mentioned. The project used GEP to probe the number of yarn imperfections present in a polyester/cotton (65;35) blend. Yarn twist and rotor speed were used as input parameters for the model. Uster 3 was used to measure the number of yarn imperfections which is the output for the model. Yarns were produced from a series of experiments carried out at Southern Range Nyanza Limited (SRNL) in Jinja, Uganda. Sliver of count 0.015Ne was used to produce the yarns Tests were carried out on the samples to obtain relevant data. The data obtained was then used to build a GEP model that was tested and validated. The model had an R-square of 0.97, RMSE, 44.5 which meant, the model was agood approximate of number of yarn imperfections. The developed model was used to study the relationship between the inputs and the outputs and conclusion, recommendation made.

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List of acronyms

GEP – gene expression programming

GP- genetic programming

ET_s- Expression Trees

ANN-Artificial Neural Networks

ITMA-International Textile machinery Asia

RPM-Revolutions Per Minute

DNA-Deoxyribonucleic acid

RNA-Ribonucleic acid

MPM-Meters Per Minute

ORF_S- open reading frames

IS- insertion sequence

RIS- root insertion sequence

Nytil- Nyanza textile industries limited

RMESE- root mean square error

CHAPTER 1 Back ground

1.1 Rotor spinning and post spinning processes

Spinning is the conversion of fibres into a yarn with the help of a twist. Rotor spinning omits the forming of a roving, after drafting the sliver is fed into rotary beater that ensures the fibers are beaten into a thin supply which enters a duct and gets deposited on the sides of a disk (rotor), the transportation of fibres is achieved through air currents[Rasike de silva et al ;2009]. Today's rotor spinning machine has a linear production rate exceeding the200m/min(compared to about 40m/min) in ring spinning, using rotor spinning means elimination of a roving since it can take sliver directly and elimination of after spinning winding due to large yarn package[Rasike de silva et al ;2009]. Rotor spinning has established its position and it accounts for more than 30% by weight of staple fibre produced in the world [FAROOQ AHMED ARAIN* et al; 2011]. The complexity of a fibre to yarn process is very high and for this complex process the model that considers all variables are very few available [A.R. Moghassen et al 2011]. Processing parameters optimization resolves most quality control problems [A.R.Moghassen et al, 2011]. In general, the spinner may define yarn quality as an index of appearance, strength, uniformity and level of irregularity [Halimi Mohamed Taher et al; 2009]. Depending on a product, yarn obtained from the spinning process may undergo knitting or weaving. If the yarn is to undergo weaving, yarn sizing must be carried out. The gray fabric obtained from the knitting or weaving is then taken through a coloration process [Lewandowski S et al, 2008]. Because of all the processes, yarn has to under undergo through to a finished fabric, production of a faultless yarn is not possible. Faults that exist in yarns include, imperfections (thin and thick places), Neps, hairiness, impurities, unevenness. One of the defects that is born in the spinning and lives through to other process is yarn unevenness caused by these imperfections.

1.1.2 Imperfections

The rotor spun yarns possess many defects, among the many there is yarn imperfections stated as the number of thick places, thin places and neps per 1000m of a yarn. In Uster 3evenness tester, thick and thin places refer to imperfections that are within the range ($\pm$ 50% with respect to mean value of the yarn cross sectional size), while neps are classified as the yarn imperfections which

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