

**KEY FACTORS INFLUENCING THE OPTIMUM
PRODUCTION BY THE GLOVE KNITTING MACHINE
IN A PRIVATE COMPANY IN SRI LANKA**

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Thesis submitted in partial fulfilment of the requirements for the
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Declaration

I declare that this is my own work, and this thesis does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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Abstract

Knitting Machines of leading rubber manufacturing company was fully booked with glove knitting orders. So, the Excess capacities were outsourced within Sri Lanka or outside of Sri Lankan region. Since the company is Customer Centric Factory, the Profit margins came down due to the outsourcing the Capacity. So, the aim of this study was to analyse and determined key factors influencing the optimum machine production for specific products. Designed experiment was used to perform this analysis. Number of defectives used as the response variable. This will allow company to do the production in-house without outsourcing. This project contains study of four main factors and its effect on production and efficiency of the flat knitting machine based on minimal defect rate. The machine base, machine servicing activity, speed of the machine and the machine type plays an important role in knitting defects.

The defect rates of knitted gloves were investigated using full factorial experimental design. The effect of machine base, machine servicing activity, machine speed and the machine type have been studied under four cases based on pareto principle. The four cases namely, Case I: 15G - Nylon, Case II: 13G - Thermostat, Case III: 13G – HPPE (High Performance Polyethylene), Case IV: 10G – HPPE. The results show that the machine base and the machine servicing have significant impact on the defects rate for all four cases, whereas, machine speed became significant for case II, III, and IV, as well as the machine type became significant impact for case IV based on linear terms. For 2-way interaction term, the machine base and the machine type have significant impact on the defects rate for case IV. The p-values of all four controlled parameters have been determined using ANOVA. The optimum parameters that correspond to the lower defects rate have also been evaluated.

Keywords: *Knitting, Design of Experiment, DOE, Optimum Parameter, Defect Rate*

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Table of contents

Declaration	i
Abstract	ii
Acknowledgement.....	iii
Table of contents	iv
List of figures	vii
List of tables.....	viii
List of abbreviations.....	ix
1. INTRODUCTION	1
1.1 Global Glove Demand.....	1
1.2 Sri Lankan Glove Manufacturing Industry	2
1.3 The Organisation.....	3
1.3.1 Glove knitting machine and capacity	4
1.4 Research Gap	5
1.5 Problem Statement	5
1.6 Objective of the study	5
1.7 Significance of the Study	6
1.8 Limitations of this Study	7
2. LITERATURE REVIEW.....	8
2.1 Knitting Process	8
2.1.1 Knitting history	8
2.1.2 Factors effecting the knitting productivity and other quality parameters ...	9
3. METHODOLOGY.....	12
3.1 Design of Experiment approach.....	12

3.1.1 Design of Experiment history and applications	12
3.1.2 General Model of Process / System	13
3.1.4 Design Selection Guideline.....	13
3.1.5 General full factorial design.....	14
3.2 Experiment Design Terminologies	14
3.2.1 The Experiment.....	14
3.2.2 Terminologies	15
3.2.3 Basic principles of Factorial experiment.....	15
3.2.4 Main Effect.....	16
3.2.5 Interaction Effect.....	16
3.2.6 Residuals	17
3.2.7 ANOVA (Analysis of Variance).....	17
3.2.8 General full factorial design – Model Summery Terminologies	18
3.2.9 Pareto Principle or 80/20 Rule	19
3.3 Experimental Design for knitting machine	20
3.3.1 Experiment design process.....	20
3.3.2 Order Analysis Based on Pareto Principle	20
3.4 Assumptions.....	22
3.4.1 Constant factor	22
3.4.2 Noise factor	23
3.5 Variable Definitions and Factor Decomposition.....	23
3.5.1 Response variable.....	23
3.5.2 Control variable.....	23
3.6 Selection of Design	25
3.6.1 Experimental design for the four cases	25
3.6.2 Preparation and Implementation of experiment.....	28

4.	RESULTS AND DISCUSSION	29
4.1	The results of the experiment	29
4.1.1	Case I: 15G - Nylon	29
4.1.2	Case II: 13G - Thermostat.....	29
4.1.3	Case III: 13G - HPPE.....	30
4.1.4	Case IV: 10G - HPPE.....	30
4.2	Interpretations of Main Effects and Interaction plot	30
4.2.1	Case I: 15G – Nylon.....	30
4.2.2	Case II: 13G – Thermostat	32
4.2.3	Case III: 13G – HPPE	33
4.2.4	Case IV: 10G - HPPE.....	34
4.3	Pareto Chart / ANOVA / Residual Plots for Standardized Effects	36
4.3.1	Case I: 15G – Nylon.....	36
4.3.2	Case II: 13G – Thermostat	38
4.3.3	Case III: 13G – HPPE	40
4.3.4	Case IV: 10G – HPPE.....	42
5.	CONCLUSIONS AND RECOMMANDATIONS	45
5.1	Conclusion	45
5.2	Recommendations	46
6.	REFERENCES.....	47
7.	APPENDIX.....	51
7.1	Appendix 1: Case I: 15G - Nylon (Factorial Design)	51
7.2	Appendix 2: Case II: 13G - Thermostat (Factorial Design).....	52
7.3	Appendix 3: Case III: 13G - HPPE (Factorial Design).....	53
7.4	Appendix 4: Case IV: 10G - HPPE (Factorial Design)	54

List of figures

Figure 1.1: Product/Process structure of the company.....	4
Figure 3.1: General Model of Process / System.....	13
Figure 3.2: 80/20 Rule Explanation	19
Figure 3.3: Experiment Design Steps Followed	20
Figure 3.4: Pareto Analysis Based on 80/20 Rule	22
Figure 3.5: Manufacturer Instruction on Machine Keeping Mechanism.....	24
Figure 3.6: Machine Over the Wooden Block and Over the Floor	24
Figure 4.1: Images of Experiment.....	29
Figure 4.2: Case I: 15G – Nylon (Interaction Effect Plots)	30
Figure 4.3: Case I: 15G – Nylon (Main Effect Plots)	31
Figure 4.4: Case II: 13G - Thermostat (Interaction Effect Plots)	32
Figure 4.5: Case II: 13G - Thermostat (Main Effect Plots)	32
Figure 4.6: Case III: 13G - HPPE (Interaction Effect Plots).....	33
Figure 4.7: Case III: 13G - HPPE (Main Effect Plots)	34
Figure 4.8: Case IV: 10G - HPPE (Interaction Plots)	34
Figure 4.9: Case IV: 10G - HPPE (Main Effect Plots)	35
Figure 4.10: Case I: 15G – Nylon (ANOVA).....	37
Figure 4.11: Case I: 15G – Nylon (Pareto Chart of Standardised Effects).....	37
Figure 4.12: Case I: 15G – Nylon (Residual Plots)	38
Figure 4.13: Case II: 13G – Thermostat (ANOVA)	39
Figure 4.14: Case II: 13G – Thermostat (Pareto Chart of Standardised Effects)	39
Figure 4.15: Case II: 13G – Thermostat (Residual Plots).....	40
Figure 4.16: Case III: 13G - HPPE (ANOVA)	41
Figure 4.17: Case III: 13G - HPPE (Pareto Chart of Standardised Effects)	41
Figure 4.18: Case III: 13G - HPPE (Residual Plots).....	42
Figure 4.19: Case IV: 10G - HPPE (ANOVA).....	43
Figure 4.20: Case IV: 10G - HPPE (Pareto Chart of Standardised Effects).....	43
Figure 4.21: Case IV: 10G - HPPE (Residual Plots)	44
Figure 5.1: Proposed Palette Truck to move Knitting Machine.....	46

List of tables

Table 1.1: Knitting machines availability - Gauge wise and machine type wise	4
Table 3.1: Design Selection Guideline.....	13
Table 3.2: Annual Production Loading (Gauge and Product wise)	21
Table 3.3: Machine Type (Manufacturer) wise Knitting Machine Availability	25
Table 3.4: Case I: 15G - Nylon (Factor Level Definition).....	26
Table 3.5: Case II: 13G - Thermostat (Factor Level Definition)	26
Table 3.6: Case III: 13G - HPPE (Factor Level Definition)	27
Table 3.7: Case IV: 10G - HPPE (Factor Level Definition)	27
Table 7.1: Case I: 15G – Nylon (Factorial Design Results)	51
Table 7.2: Case II: 13G – Thermostat (Factorial Design Results).....	52
Table 7.3: Case III: 13G – HPPE (Factorial Design Results).....	53
Table 7.4: Case IV: 10G – HPPE (Factorial Design Results).....	54

List of abbreviations

ANOVA	-	Analysis of Variance
CAGR	-	Compound Annual Growth Rate
COVID	-	Coronavirus Disease
DOE	-	Design of Experiment
EDB	-	Export Development Board
ERP	-	Enterprise Resource Planning
HPPE	-	High Performance Polyethylene
MS	-	Mean Square
MSE	-	Mean Square Error
PPE	-	Personal Protective Equipment
RPM	-	Revolutions per Minute
UNIDO	-	United Nations Industrial Development Organization
UV	-	Ultraviolet
UPF	-	Ultraviolet Protection Factors