PHYSICAL PROPERTIES OF SEWING THREADS AND THEIR PERFORMANCE IN RELATION TO SEAM CONSTRUCTION

by

CRL Geeganage



A dissertation submitted to the Department of ·
Textile & Clothing Technology of the University of Moratuwa in partial fulfillment of the requirements of the degree of



in

Textile Studies

January 2004

677 "04" 677.071.6

Department of Textile & Clothing Technnology University of Moratuwa Sri Lanka

um Thesis coll

79598

University of Moratuwa

79598

The work presented in the thesis in part or whole, has not been submitted for any other academic qualification at any institution.

UOM Verified Signature

C.R.L.Geeganage (Candidate)

UOM Verified Signature

Mr.D.P.D.Dissanayake (Supervisor)



Abstract

Polyester spun sewing thread is commonly used in high-speed sewing machines in the garment manufacturing process.

Recently core spun sewing threads produced with polyester filament core and polyester sheath fibres have been introduced to the local garment industry. Poly/ploy core spun thread is believed to give superior quality performance in seams.

The spun polyester and core spun sewing threads are having different structures and as such, their properties will be significantly different.

The behavior of these threads in different types of seams would provide an insight to the performance of core spun (poly/poly) and 100% polyester sewing threads.

The results of this research project show that the core spun would give superior performance in seams and the thread consumption is less when the core spun thread is used.

ACKNOWLEDGEMENT

I have great pleasure in declaring my honour to Dr. (Mrs.) Nirmali de Silva, Head, Department of Textile and Clothing, University of Moratuwa for the privilege given to follow this valuable course.

I offer my most sincere thanks to my project supervisor Mr. D P D Dissanayake, Senior Lecturer for his encouragement, guidance and advice generously given to me during the project period.

I wish to express my gratitude to all the academics of the Department of Textile Clothing Technology of the University of Moratuwa for the assistance supporting me in various ways for the completion of this project.

I am much thankful to the Technical officer Mr. H.M. Senevirathe and the other non-academic staff members for the assistance me in various ways for the completion of this project.

Special thanks also goes to my friend Kumuduni, my husband and my two babies who helped me to complete this project successfully.



CONTENTS

Page No.

Chapter 1		
Introduction	01	
Literature survey		
 1.1 Seam Definition, Classification and Designation 1.1.1 Seam Definition 1.1.2 Seam Designation 1.1.3 Seam Classification 1.2 Joining Materials 1.2.1 Stitching Materials 1.2.1.1 Sewing Thread Definition 1.2.1.2 Thread Structure 1.2.1.2.1 Spun Yarn 1.2.1.2.2 Mono Filament Thread 1.2.1.2.3 Multifilament Threads 1.2.1.2.4 Core Spun Thread 1.2.1.3 Yarn Twist and its effect on sewing thread 1.2.1.3.1 Physical Properties of Threads 1.2.1.3.2 Physical Properties of Cotton Threads 1.2.1.3.3 Physical Properties of Synthetic Threads 1.2.1.4 Yarn Numbering and Yarn count systems 1.2.1.5 Definition of Ticket Number 1.2.1.5.1 Definition of Cotton Ticket Number 	02 02 03 03 03 04 04 05 05 05 07 07 08 08 08	
1.2.1.5.2 Definition of Synthetic (Metric) Ticket Number 1.3 Surface Characteristics and Appearance of Seams	09	
 1.3.1 Fabric Finishing 1.3.2 Seam Pucker 1.3.3 Major factors contributing to pucker 1.3.4 Performance of Seams 1.3.4.1 Seam Strength, Extensibility and Elasticity 	09 09 10 12 12	
1.3.4.2 Transverse Stress and Strain 1.3.5 Material Failure at the Seam	13	
1.3.5.1 Seam Slippage 1.3.6 Thread Failure in the Seam 1.3.6.1 Linear Stitch Density 1.3.6.2 Stitch Type	13 13 13 14	
1.3.6.3 Seam Type 1.3.6.4 Thread Strength 1.3.7 Seam Angle in relation to Fabric Structure 1.3.8 Thread Extensibility 1.3.9 Durability	19 21 21 22 23	
1 3 10 Security	23	

	Page No.
Chapter 2	
Materials and Methods	
 2.1 Scope 2.1.1 Sewing thread test method 2.1.2 Irregularity (Unevenness)test method 2.1.3 Seam test method 2.2 Sewing Threads 2.3 Conditioning and Testing Atmosphere 2.4 Adjustment of Sewing Machine 2.5 Preparation of Test Specimen 	24 24 24 25 25 25
2.5.1 Cutting 2.5.2 Conditioning 2.6 Test Procedure	26 27 27
Chapter 3	
Results and Evaluation	
3.1 Calico material 3.1.1 Fabric specification 3.1.2 Seam strength 3.1.3 Graphical representation of seam strength	28 28 29
3.2 Satin material 3.2.1 Fabric specification 3.2.2 Seam strength 3.2.3 Graphical representation of seam strength 3.2.4 Graphical representation of seam slippage	30 30 31 32
 3.3 Sewing Threads 3.3.1 Load and Extension of threads 3.3.2 Linear density and Tenacity of threads 3.3.3 Irregularity of Threads 3.3.4 Graphical representation of Relationship between Type of Sewing Thread and Breaking Load 	33 33 34 34
3.3.5 Graphical representation of Relationship between Type of Sewing Thread and Extension percentage	35
3.3.6 Graphical representation of Relationship between Type of Sewing Thread and Tenacity	35
3.3.7 Graphical representation of Relationship between Type of Sewing Thread and Irregularity of Threads	35

Chapter 4		
Conclusions	36	
References	37	
APPENDIX		
Test Results		
A.1.Seam Strength of Calico material		
A.1.1 Seam type; Plain seam A.1.1.1 Spun Polyester-Ticket No.: 120 A.1.1.2 Spun Polyester-Ticket No.: 180 A.1.1.3 Core Spun Polyester-Ticket No.: 120 A.1.1.4 Core Spun Polyester-Ticket No.: 180	i i ii ii	
A.1.2 Seam type; French seam A.1.2.1 Spun Polyester-Ticket No.: 120 A.1.2.2 Spun Polyester-Ticket No.: 180 A.1.2.3 Core Spun Polyester-Ticket No.: 120 A.1.2.4 Core Spun Polyester-Ticket No.: 180	iii iii iv iv	
A.1.3 Seam type; Lap felled Seam A.1.3.1 Spun Polyester-Ticket No.: 120 A.1.3.2 Spun Polyester-Ticket No.: 180 A.1.3.3 Core Spun Polyester-Ticket No.: 120 A.1.3.4 Core Spun Polyester-Ticket No.: 180	V V Vi	
A.1.4 Seam type; Bound seam A.1.4.1 Spun Polyester-Ticket No.: 120 A.1.4.2 Spun Polyester-Ticket No.: 180 A.1.4.3 Core Spun Polyester-Ticket No.: 120 A.1.4.4 Core Spun Polyester-Ticket No.: 180	vii vii viii viii	
A.2. Seam Strength of Satin material		
A.2.1 Seam type; Plain Seam A.2.1.1 Spun Polyester-Ticket No.: 120 A.2.1.2 Spun Polyester-Ticket No.: 180 A.2.1.3 Core Spun Polyester-Ticket No.: 120 A.2.1.4 Core Spun Polyester-Ticket No.: 180	ix ix x x	

Page No.

	Page No
A.2.2 Seam type; French seam	
A.2.2.1 Spun Polyester-Ticket No.: 120	xi
A.2.2.2 Spun Polyester-Ticket No.: 180	xi
A.2.2.3 Core Spun Polyester-Ticket No.: 120	xii
A.2.2.4 Core Spun Polyester-Ticket No.: 180	xii
A.2.3Seam type; Lap felled seam	
A.2.3.1 Spun Polyester-Ticket No.: 120	xiii
A.2.3.2 Spun Polyester-Ticket No.: 180	xiii
A.2.3.3 Core Spun Polyester-Ticket No.: 120	xvi
A.2.3.4 Core Spun Polyester-Ticket No.: 180	xvi
A.2.4 Seam type; Bound seam	
A.2.4.1 Spun Polyester-Ticket No.: 120	XV
A.2.4.2 Spun Polyester-Ticket No.: 180	XV
A.2.4.3 Core Spun Polyester-Ticket No.: 120	xvi
A.2.4.4 Core Spun Polyester-Ticket No.: 180	xvi
A 2 Throad Irragularity	vo di
A.3 Thread Irregularity	xvii
A.4 Breaking Strength and Extension of sewing threads Spun Polyester	xix
A.5 Breaking Strength and Extension of sewing threads -Core Spun Polyester	xx .
A.6 Linear Density and Tenacity of sewing threads	xxi