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Research Article

Experimental Analysis of Static Thread Tension on Seam Appearance

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Abstract

Investigate the impact on seam appearance due to fabric weight, bending rigidity and static thread tensions at single needle lock stitch sewing machine. The intersection among the stated parameters is crucial at stitched fabric to predict seam appearance. Sixteen different weights of fabrics are investigated at fixed foot pressure, needle diameter, bobbin thread tension to explore the effect of intersection. Present work is suggested that intersection of bending rigidity of fabric and thread has strong linear relationship to magnitude of static needle thread tension at lock stitched sewing machine to predict the aesthetic seam appearance of stitched fabrics.

Keywords: Seam pucker, Thread tension, Lock stitch, Bending Rigidity

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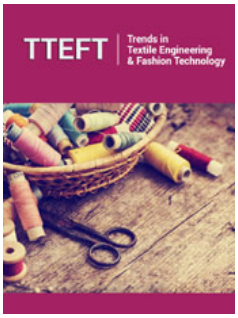

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Introduction

In the clothing industries, fabric, sewing thread and sewing machine plays an important for the seam appearance of stitched fabrics [1-7]. Influence mechanical and physical properties of sewing thread are important to predict and evaluate seam pucker. Seam pucker is a crucial tool to examine the aesthetic seam appearance of stitched fabric. In the stitching of lightweight woven fabrics, bending rigidity is a tool to predict the seam appearance of a stitched fabric. It was established that fabric bending rigidity has high magnitude in comparison with sewing thread to produce balanced seam without pucker.

In contrast bending rigidity of sewing thread should be integrated with static sewing thread tension at sewing machine to elude seam pucker. The present work is focused on the experimental exploration of fabric bending rigidity with increasing trend of static needle thread tension at single needle sewing machine on visual assessment of pucker at 80 stitched fabrics samples.

Materials and Methods

The visual assessment of pucker

Figure 1: AATCC88B the set-up of the five standards and samples.

A visual assessment procedure has been developed by the American Association of Textile Chemists and Colorists (AATCC-88B). In this procedure, three observers compare three specimens of a particular seam with a series of five photographs of increasingly severely

puckered seams, numbered 5 to 1. Grade 5 is given to a sample with no puckering while a seam with very severe puckering is graded 1. Figure 1 shows an example of the set-up of the five standards and samples of one of our experimental seams. This procedure was used to assess visually the seams produced using same threads to stitch all sixteen fabrics at 25gf, 50gf, 75gf 100gf and 125gf, i.e. there were 80 seams in all.

Properties of the experimental materials

Threads: The core spun sewing thread is used which have mean diameter 0.0436cm bending rigidity 4.1x10-3gfcm^2 per thread. Thread diameter was assessed microscopically at 20 points along the thread. Also, the thread bending rigidities were evaluated using the KES-FB2 tester.

Fabrics: The Sixteen different weight fabrics (g/m^2) are used to investigate the effect of bending rigidity of fabric with increasing trend of needle thread tension while other factors kept fixed. The fabric bending rigidities (BR) were measured using the FAST-2 while the fabrics are of thin shirting hardly compressible material. Table 1 gives the mean of five tests in each case.

Table 1: Fabric Evaluation.

Fabric Code	Fabric weight,g/m^2	FAST-2 BR, μ N.m	Fabric Code	Fabric weight, g/m^2	FAST-2, BR,μ N.m
F1	68	3	F_9	119	9
F2	95	5.38	F_{10}	120	10.5
F3	100	5.9	F_{11}	121	11.44
F4	104	3.74	F_{12}	124	10
F5	109	6.96	F_{13}	125	9.5
F6	111	6.23	F_{14}	126	11.5
F7	115	7.23	F_{15}	127	11.5
F8	118	10.21	F_{16}	130	12

Single needle sewing machine setting: Machine model: Fully digital, DDL9000c, Machine was pre-set at the fixed settings as under:

A. Sample Size = 250X50mm

B. Speed = 3000 stitchs/min

C. Stitch density= 5 stitches per cm

D. Foot Presser pressure = 5.1kgs

E. Bobbin thread tension was adjusted according to machine standard.

Fabric was made to be wrinkle free prior to stitching. Centre was marked to make sure the stitch is made at center. Total 80 samples will be investigated where sixteen fabric samples were stitches from each weight of the fabric at 25gf 50gf, 75gf, 100gf, 125gf needle thread tension.

Results

The results in Table 2a & 2b are plotted in Figures 2-6. All set of data exhibit a strong linear relation (the correlation coefficient r = in all cases), which suggests that the bending rigidity of the fabric is considered with static needle thread tension as useful measure of the tendency of a seam to pucker or elude to pucker. It is revealed that relative magnitude of fabric and thread bending rigidity should be considered with static tension of needle thread at sewing machine to elude seam pucker for different weight of fabrics.

Table 2a: Pucker assessment at different needle thread tension.

	AATCC-88B, Seam Pucker grades at Different Needle Thread Tension				
Fabric Code	25gf	50 gf	75gf	100gf	125gf
F1	2	2	1	1	1
F2	3	3	2	2	1
F3	3	3	2	2	1
F4	3	3	2	2	2
F5	4	4	4	3	3
F6	4	4	4	3	3
F7	4	4	3	3	2
F8	5	5	4	4	3

Table 2b: Pucker assessment at different needle thread tension.

	AATCC-88B, Seam Pucker grades at Different Needle Thread Tension			
Fabric Code	25gf	50 gf	75gf	100gf
F9	4	4	4	4
F10	5	5	4	4
F11	4	4	4	4
F12	5	4	4	3
F13	5	4	4	3
F14	5	4	4	3

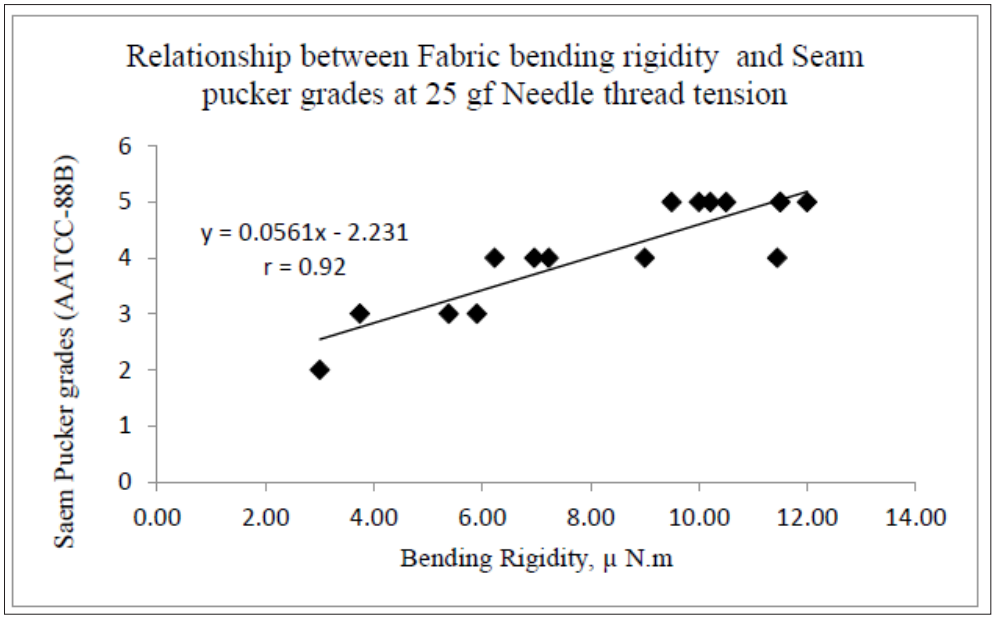

Figure 2: Seam appearance at 25gf Needle thread tension.

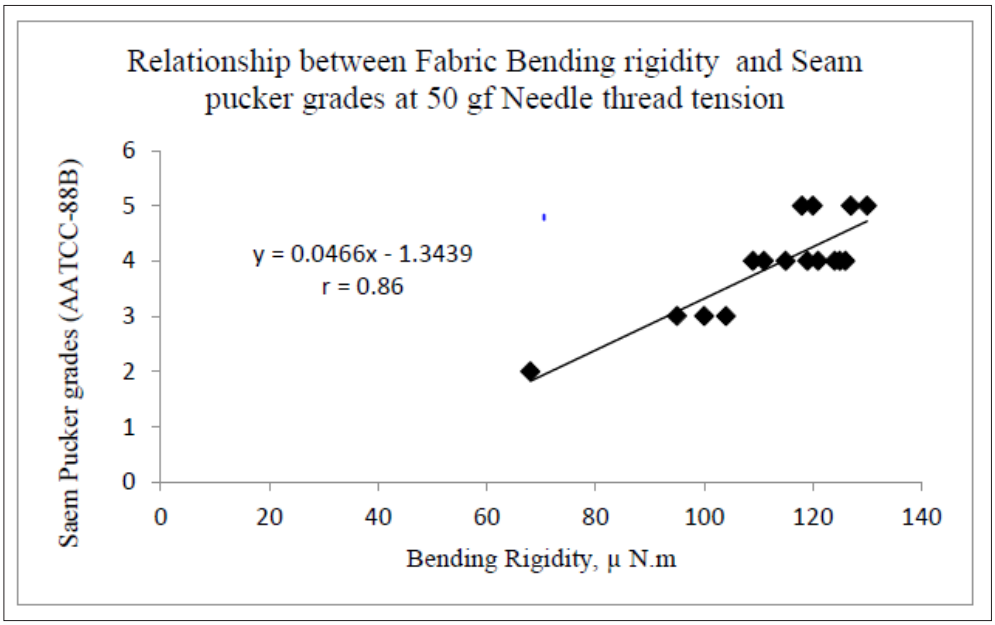

Figure 3: Seam appearance at 50gf Needle thread tension.

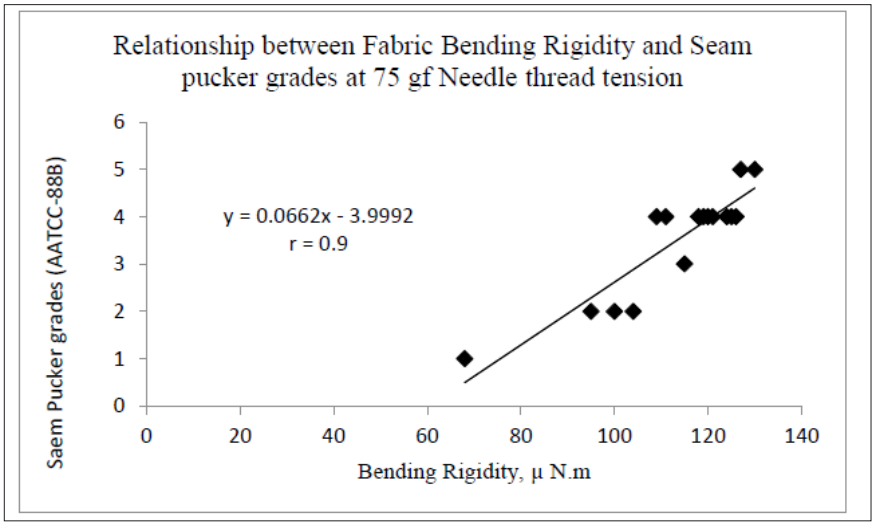

Figure 4: Seam appearance at 75gf Needle thread tension.

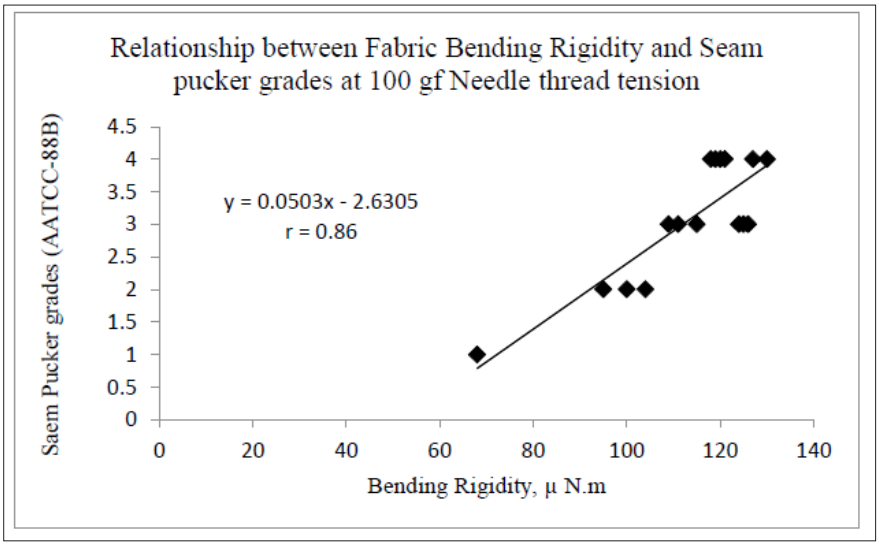

Figure 5: Seam appearance at 100gf Needle thread tension.

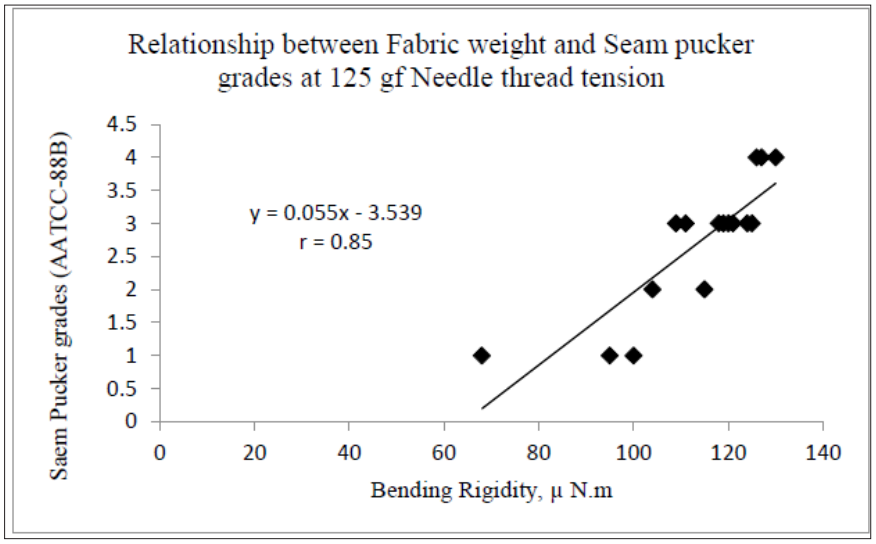

Figure 6: Seam appearance at 150gf Needle thread tension.

Conclusion

The experimental result revealed that static sewing thread tension is played an important to improve the garment seam appearance. The intersection of relative magnitude of bending rigidity of fabric and thread with static needle thread tension at sewing machine reflects strong correlation to predict the seam appearance. The presented experimental finding provides the industrial guideline to select the static needle thread tension along with fabric weight, bending rigidity to improve seam appearance.

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