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Research Article

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An Experimental Analysis into Thread Cycling Recovery on Seam Appearance

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Abstract

Resultant behavior of sewing thread cycling recovery on stitched fabrics played an important role on the prediction of seam appearance.

In this present research cycling recovery behavior of four different sewing threads is explored which were stitched with 10 different light weight woven fabrics.

Experimental analysis concluded that low cycling recovery magnitude plays an important characteristic to predict the seam pucker.

Keywords

Seam pucker; Sewing thread; Fabric weight; Cycling recovery; Single needle lock stitch

Introduction

In the stitching process, consideration must be given to the change in appearance of the fabric from flat and smooth to stitch; after sewing, the stitched assembly can still be flat and smooth or it can exhibit deformation along the seam line.

In the clothing manufacturing industry, the focus is on the effects of fabric properties on seam appearance but the importance of appropriate thread selections is often overlooked.

The resultant behavior of sewing thread attributes on stitched fabric played an important role on the prediction of seam appearance [1,2]. The compatibility of the fabric and sewing thread with the sewing process depends on their bending, contraction and extension properties [3-5].

Sewing thread one cycle behavior at 2 N load was reported for the predication of seam pucker[6]. while fabric bending rigidity and actual thread cycles before incorporate at sewn fabric on actual static thread load should be analyzed.

The present work is focused on the experimental exploration of sewing thread cycling recovery magnitude at established fourth cycle of static needle thread tension at single needle sewing machine on visual assessment of pucker at 100 stitched fabrics samples.

Materials and Methods

Qualitative assessment of seam pucker

A qualitative visual assessment procedure is 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 1 to 5. Grade 5 is provided 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 different sewing threads to stitch all ten fabrics i.e. there were 100 seams in all.

Threads

The four different counts of core spun sewing threads are characterized and Table 1 gives the mean of five tests in each case:

1. Thread diameter was assessed microscopically at 20 points along the thread.

2. ISO 2060 standard used for Thread Count (dtex).

3. Sewing thread recovery behaviour of sewing threads is measured at the Instron tensile testing machine 3345 k 7484 using a 10N load cell by established procedure; Gauge length =35 mm, No of cycles= 4, Minimum and maximum load=35 g_f and 350 g_f and rate=350 mm/min.

Figure 2 is a representative cycling graph of sewing thread $T_{4;}$ 100 percent polyester core spun, plastic extension and recovery is mentioned. Plastic extension is determined by measuring on the axis of abscissa the distance from origin point of coordinates to the end point of a fourth return part of unloading loop. Recovery was determined by measuring on the same axis the distance from the end point of a fourth return part of unloading the loop to the node of the abscissa and a perpendicular line drawn from the top of a fourth loop. Table 1 Sewing threads properties are shown [7].

Figure 1: AATCC-88B Qualitative assessment of seam pucker grades.

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Table 1: suggested that among evaluated four threads, T_2 and T_4 are exercised to analysis the cyclic recovery magnitude on different stitched fabrics.

Serial no	Thread	Count (dtex) (ISO 2060)	Composition /Material	Sewing thread diameter µm	Avg. recovery on fourth cycle (%)	Plastic extension on fourth cycle (%)
1	T_1	217.1	Poly/cotton	436.3	69.69	30.31
2	T_2	228	Polyester	347.6	75.78	24.22
3	T_3	140	Polyester	237.1	58.18	41.82
4	T_4	107.6	Polyester	235.6	57.43	42.57

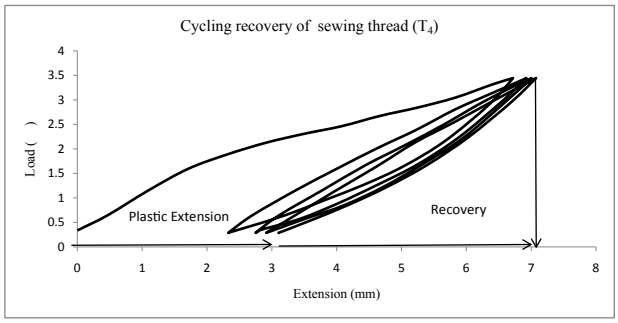

Figure 2: Cycling recovery of sewing thread T_4, plastic and elastic recovery extension.

Fabrics

The 10 different weight fabrics (g/m^2) are used to investigate the effect of cycling behavior of sewing thread with different bending rigidity of fabrics at stitched assembly 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 2 gives the mean of five tests in each case.

Single needle machine setting

Machine model: Fully digital, DDL9000c

Machine was pre-set at the fixed settings as under:

- Sample Size=250X50 mm
- Speed=1200 stitchs/min
- Stitch density=5 stitches per cm
- Foot Presser pressure=5.1 kgs
- 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 100 samples will be investigated where ten fabric samples were stitches from five each weight with sewing threads T_2 and T_4.

Results

The result of Table 3 is plotted in (Figures 3-4). All set of data exhibit a strong linear relation (the correlation coefficient in all cases), which suggests that the magnitude of cycling recovery of sewing thread is considered along bending rigidity of the fabric at static needle thread tension as a useful measure of the tendency of a seam to pucker or elude to pucker.

It is established that relative magnitude of fabric bending rigidity and thread cycling recovery should be considered with static needle thread tension at sewing machine to elude or predict seam pucker for different light weight of fabrics.

Table 2: Light weight Fabric properties.

Fabric Code	Fabric weight, g/m²	FAST-2 BR, µ N.m	Fabric Code	Fabric weight, g/m²	FAST-2, BR, µ N.m
F_1	68	3.00	F_6	111	6.23
F_2	95	5.38	F_7	115	7.23
F_3	100	5.90	F_8	118	10.21
F_4	104	3.74	F_9	119	9.00
F_5	109	6.96	F_{10}	120	10.50

Table 3: Assessment of seam pucker grade with Qualitative Pucker Standard.

AATCC-88B, Seam Pucker grades at different cycling recovery of sewing threads					
Fabric Code	T_2	T_4	Fabric Code	T_2	T_4
F_1	1	2	F_6	3	4
F_2	2	3	F_7	3	5
F_3	2	4	F_8	4	5
F_4	2	3	F_9	3	5
F_5	3	4	F_{10}	4	5

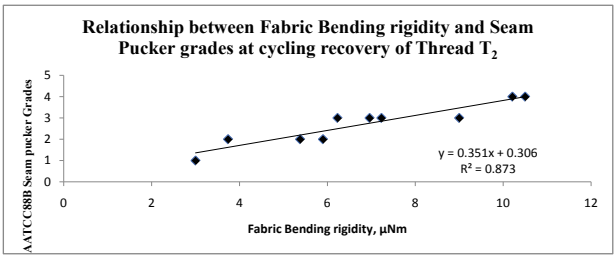

Figure 3: Resultant behaviour of sewing thread cycling recovery on stitched fabrics.

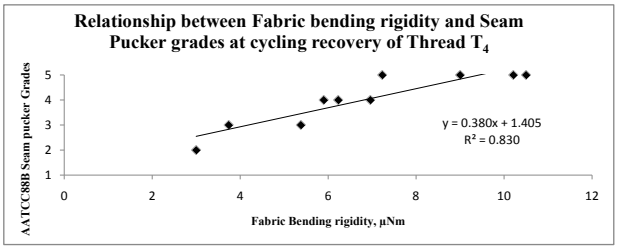

Figure 4: Resultant behaviour of cycling recovery of sewing thread (T_4) on stitched fabrics.

Conclusion

The experimental result revealed that resultant magnitude of fabric bending rigidity and cycling recovery of sewing thread is played an important to improve the garment seam appearance. The intersection of relative magnitude of bending rigidity of fabric and cycling recovery of swing thread with static needle thread tension at sewing machine reflects strong correlation to predict the seam

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appearance. The obtainable experimental finding provides the industrial guideline to select the low magnitude cycling recovery sewing thread along with fabric weight, bending rigidity to improve seam appearance.

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