

“Behavior of Seam Puckering of Polyester, Cotton & blends fabric on High Sewing Thread Tension”

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ABSTRACT

The garment quality means the quality of seam, which is the very important feature of any form of fabric assembly using sewing operations. The investigation has attempted to find out the relationship between fabric elongation & stitch thread tension on the occurrence of seam puckering at different woven fabric samples. In this attempt the different types of four fabrics are used to analyze the occurrence of seam puckering at high sewing thread tension. The trend of seam puckering is evaluated by the calculation of seam puckering coefficient percentage at different tension level. This study brought the results that seam puckering is majorly depended upon the quality of material, sewing machine & skills of operator. The tendency of more seam puckering has been observed on the high sewing thread tension in all fabric samples whereas the level of seam puckering is high in case of polyester dominated fabric with high elongated value. The occurrence of seam puckering found more in warp direction. That is the determination of correct sewing tension setting with performance of woven elongation for a desirable & undesirable occurrence of puckering. Keywords: Fabric Elongation, Sewing thread tension, Seam puckering coefficient

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I. INTRODUCTION

Seam puckering is a common interesting phenomena of garmenting process. Seam puckering is the waviness structure of seam line in the fabric. Seam puckering effect is the resultant phenomena based upon the various mechanical properties of fabric and various technological parameters of sewing machine. [4,5,6]

The fabric elongation is also important aspect of the quality garmenting process because it affects the movement of fabric during garment. In the previous work [1-2], the fabric elongation played a major role in quality consideration for clothing manufacturing. Other studies on seam puckering [7,9,10] exhibited guidelines for the garment manufacturers on seam performance.

This study provides the opportunity to evaluate the relationship between fabric elongation and seam puckering occurrence. In this study, combinations of fabric samples are taken into consideration and sewn on warp and weft direction. Moreover, the influences of different fabric elongation value in warp & weft direction on seam performance & appearance

would also be studied on the basis of seam puckering coefficient.



(Fig.No.1- Occurrence of Seam Puckering)

II. MATERIALS AND METHODS

2.1 Materials:

2.1.1 Fabric:

Commercially available and usually popular in market, the four types of shirting fabrics of polyester and cotton with different blend composition are taken into consideration for this study. The details of suiting fabric are-

Table no.1, Type of Fabric

Type of Fabric	Given Title
100% Polyester	F1
60:40 Cotton & Polyester	F2
70:30 Cotton & Polyester	F3
100% Cotton	F4

2.1.2 Sewing Thread:

The sewing threads are configured for number of plies, actual linear density, twist direction and tensile properties are used. Commercially available & usually popular polyester sewing threads of different colour with same number is used for this study.

(Table No.2-Type of Sewing Thread)

Sewing Thread No.	Material	Colour
40	100% Polyester	<ul style="list-style-type: none"> Brown-Bobbin Thread White-Cop Thread



(Figure no.2, Single Needle lock stitch machine)

2.1.3 Sewing Machine:

The most common & popular single needle lock stitch sewing machine for simple sewing operation is used for study. During sewing sample preparation the static bobbin thread tension is kept constant with other technological parameters of machines are kept constant.

(Table No.3-Type of Sewing Machine)

Type	Company	Needle No.	Dial No.	Stitch per inch	Speed(rpm)
Single Needle Lock stitch	Juki Japan	16 No.	2.5	10	5500



Figure no.2, Single Needle lock stitch machine)

2.1.3 Fabric Testing

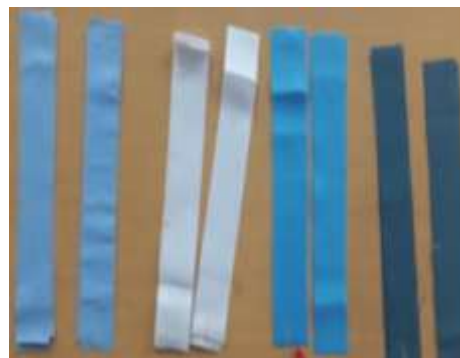
Test Parameters	F1		F2		F3		F4		Unit
	Length	Width	Length	Width	Length	Width	Length	Width	
Fabric Crimp	-0.65	-0.60	-2.15	-1.33	-5.33	2.08	-2.25	-2.42	%
Fabric Strength	100.5	46.48	117.2	96.01	106.91	98.95	53.8	24.01	lbs
Fabric Elongation	31.11	21.85	30.42	17.03	34.61	16.81	9.75	10.37	%

2.2 METHODS:

2.2.1 Fabric sample preparation

First Stage of this study, procurement of suitable fabric .In that we used 4 different fabrics mentioned in that Table no.1.The main fabric specifications are tested under the standard condition. , The different tests are carried out for this study fabric elongation, thickness, ends per inch, picks per inch, warp & weft count.

In second stage, we prepared the samples with measurement of 30*5 Centimeter (approximate 12*2 inches). We prepared the samples in warp & weft direction of each fabric samples.



(Figure no.3-Sample preparation)

2.2.2 Seam sample preparation

In next stage, we applied the stitch on separate warp & weft wise direction of fabric samples at single needle lockstitch sewing machine, Juki, Japan and produced a balance seam under the constant sewing speed, needle size, standard sewing thread counts, feed system and bobbin thread tension. In this stage we used High sewing thread tension-

The seam samples have prepared in such a way that the seams run through the middle of each samples. In that total number of seam samples are 4*2*3=24 that are each warp & weft of separate 4 different fabrics on high level of

sewing thread tension. Seam samples have observed carefully & noted the puckering length (Shrinkage pucker) then Calculate the seam puckering coefficient, the formula is

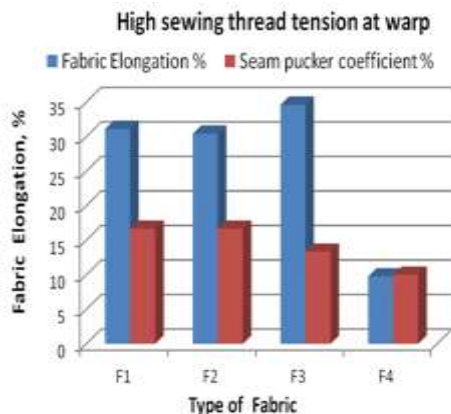
$$P_0 = (L_0 - L_1 / L_0) * 100$$

Whereas L_0 is initial sample length, L_1 is sewn length of sample, P_0 is seam puckering coefficient.

Thereafter we prepared and analyzed the different related tables of observed value of seam puckered with different fabric elongation value at high sewing thread tensions. The observed data are exhibited by graphs.

III. RESULTS & DISCUSSION

3.1 Study on fabric elongation and seam puckering coefficient at high thread tension before wash



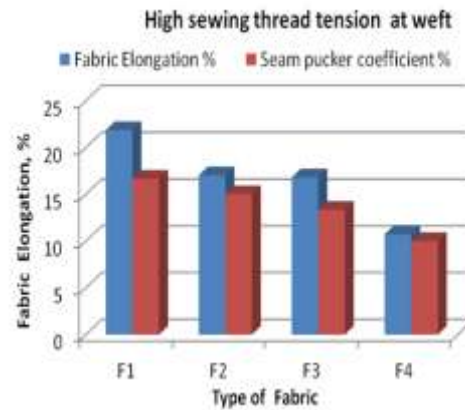
(Graph no.1 Fabric Elongation with Seam puckering coefficient at High Sewing thread tension warp wise)

Table No 4 Fabric Elongation with Seam puckering coefficient at High Sewing thread tension warp wise

Fabric	Fabric Elongation %	Seam pucker coefficient %
F1	31.11	16.66
F2	30.42	16.66
F3	34.61	13.33
F4	9.75	10

This graph showed that occurrence of very high seam puckering in F1,F2,F3 with polyester contained fabric and 10% seam puckering showed by F4 contained 100% cotton .high fabric elongated fabric showed very high seam puckering coefficient at high sewing thread tension .

(Graph no.2 Fabric Elongation with Seam puckering coefficient at High Sewing thread tension weft wise)



(Table no.5 Fabric Elongation with Seam puckering coefficient at High Sewing thread tension weft wise)

Fabric	Fabric Elongation %	Seam pucker coefficient %
F1	21.85	16.66
F2	17.08	15
F3	16.81	13.33
F4	10.75	10

This graph showed that occurrence of very high seam puckering in F1,F2,F3 with polyester contained fabric and 10% seam puckering showed by F4 contained 100% cotton .high fabric elongated fabric showed very high seam puckering coefficient at high sewing thread tension .

Table no.13 summary chart for relationship between fabric elongation and seam puckering coefficient at warp & weft wise

Fabric	E% (Warp-Weft)	Seam puckering coefficient at High Sewing Thread Tension	
		Warp	Weft
F1	High (33-20%)	Yes High 16%	Yes High 16%
F2	High (30-17%)	Yes High 16%	Yes High 15%
F3	High (34-10%)	Yes High 13%	13% Yes High
F4	Low (9-10%)	Yes High 10%	Yes High 10%

E%-Fabric Elongation percentage level

IV. CONCLUSION

This study concludes that, in the application of High sewing thread tension that gives high percentage of seam puckering

coefficient more than 10%. The high elongated valued fabric showed high occurrence of seam puckering in High Sewing thread tension. The tendency of seam puckering has observed less in weft wise direction as compare to warp direction .The tendency of seam puckering is also depended upon the type of fabric, fabric elongation, fabric structure, type of sewing thread , sewing thread tension, feed tension, and skill of operator.

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