

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

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### ABSTRACT

The garment quality largely depends on seam quality, which is the very important feature of any form of fabric assembly using sewing operations. This study attempts to find out the behavior of Polyester, Cotton & their blends fabrics on the occurrence of seam puckering during garmenting at high sewing thread tension. Four different types of fabrics are analyzed for 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 levels. This study suggested that seam puckering is majorly depended upon the quality of material, sewing machine & skills of operator. The tendency of high seam puckering has been observed at high sewing thread tension in all fabric samples and comparatively polyester dominated fabrics showed high seam puckering. The occurrence of seam puckering is found more in warp direction. That is the determination of correct sewing tension setting with performance of woven elongation for a desirable and undesirable occurrence of puckering.

Keywords: Fabric Elongation, Sewing thread tension, Seam puckering coefficient

Date of Submission: 20-05-2018

Date of acceptance: 05-06-2018

### I. INTRODUCTION

Seam puckering is the waviness structure of seam line in the fabric and is considered to be a common interesting phenomenon of the garmenting process. 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 its affect the movement of fabric during garment. In the previous work [1-2], the fabric elongation played 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 behavior of polyester, cotton & their blends fabrics on occurrence of seam puckering at high sewing thread tension sewing operation. In this study, combinations of fabrics 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 base 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. Table 1 elaborates on the type of suiting fabric used for this study -

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"> <li>Brown-Bobbin Thread</li> <li>White-Cop Thread</li> </ul>



(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 along with other technological parameters of machine.

(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 )

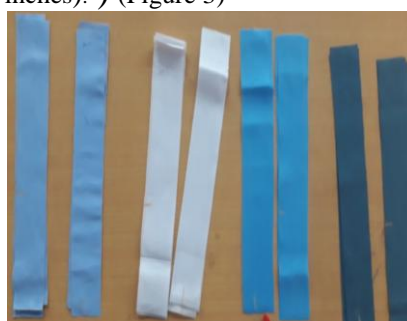
#### 2.1.3 Fabric Testing

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 involves the procurement of 4 different suitable fabrics. (Table 1).The related fabric specifications are tested under the standard condition. , The different tests are carried out include study fabric elongation, thickness, ends per inch, picks per inch, warp & weft count. In second stage, the samples are prepared in warp & weft direction of each fabric samples with measurement of 30\*5 Centimeter (approximate 12\*2 inches. ) (Figure 3)



(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.

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  $4 \times 2 \times 3 = 24$  that are each warp & weft of separate 4 different fabrics on 3 different levels of high level of sewing thread tension. Seam samples have observed carefully & noted the puckering length then Calculate the seam puckering coefficient [6,7], the formula is

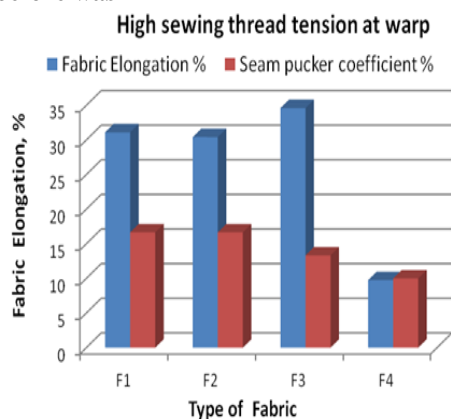
$$P_o = (L_0 - L_1 / L_0) * 100$$

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

Subsequently, the different related tables of the observed value of seam puckered with different fabric elongation value at high sewing thread tensions were prepared and analyzed. The observed data is exhibited using graphical representation.

## III. RESULTS & DISCUSSION

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



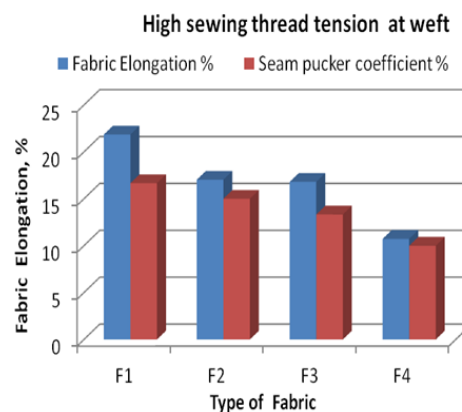
(Graph no.1 Fabric Elongation with Seam puckering coefficient at High Sewing thread tension warp wise )

**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	17.03	15
F3	16.81	13.33
F4	10.73	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 (30-20%)	Yes High 16%	Yes High 16%
F2	High (30-17%)	Yes High 16%	Yes High 15%
F3	High (34-16%)	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 polyester showed high occurrence of seam puckering at 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 and structure, type of sewing thread, sewing thread tension, feed tension, and skill of operator.

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Ajay Shankar Joshi “Behavior of Seam Puckering of Polyester, Cotton & their blends fabrics on Journal of Engineering Research and Applications (IJERA) , vol. 8, no.6, 2018, pp.01-04