

Impact of Sewing Thread Count on Seam Strength

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Abstract

In a garment the strength of seam assembly is termed as Seam strength. Among some other factors, Seam strength is basically functioned by the strength of the thread, type of fabric used for the seam and type of seam in a garment. Breaking of sewing thread or tearing of the fabric at the seam or excessive slippage of yarn to the adjacent stitches or a combination of the aforementioned conditions can cause the failure of seam. The objective of this study is to find out the effect of different sewing thread count on the strength of seam. For this experiment, a fabric having construction (EPI: 75, PPI: 42, Warp count: 10 Ne and Weft count: 8 Ne) has been selected. Then, the samples have been prepared according to ISO 13935-2:1999 method. After that, seam strength of all the samples have been tested using seam strength tester. For this experiment, different stitch like lock stitch 301, chain stitch 401 and different sewing thread count 20/2 Ne, 20/3 Ne & 40/2 Ne have been selected. Finally, the seam strength reports are collected from the machine. From the result, it can be said that if finer count in indirect system sewing thread is used for sewing, higher will be the seam strength. Moreover, the seam produced with chain stitch has the higher seam strength than seam produced by lock stitch seam.

1. Introduction

Stitches and seams are basic constituent of a quality garment. These are responsible to give the apparel a shape for wear by joining different components of apparel [1]. The overall performance of any garments in use are basically rely on the seam quality especially strength of seam [2]. A process of transforming two-dimensional fabric into three-dimensional clothing by assemble two or more pieces together is defined as Seam [3]. Sewing is the joining of two or more fabric pieces by using sewing machines, sewing threads and various types of stitching methods [4]. The main raw-materials of garment is sewing thread and fabric. The quality of seam in a garment is influenced by the properties of raw material and the quality of fabric does not fulfil all the criteria alone for preparing high quality garments [5, 6]. So, selection of proper raw material not only provides comfort to the wearer but also it helps in smooth functioning of manufacturing process and finally lead to fault free product [7]. In apparel industry, the quality of seam is evaluated by means of its elongation, efficiency, bending, strength of seam, stiffness, resistance to abrasion, and damage of seam. A good seam having different aesthetic and functional requirements and the functional performance of seam is evaluated by efficiency, elongation, bending stiffness, and resistance to washing and resistance to abrasion of seam. The durability of Seam depends on strength and seam efficiency along with the appearance of the seam [8]. Seam strength is the strength of seam assembly in apparel which is functioned by the strength of the thread, type of fabric used for the seam and type of seam assembly in apparel. It is essential to select the appropriate type of Sewing thread, seam and sewing conditions for getting a quality product [9]. Some research work has been performed on seam strength analysis. Researchers found that fabric tensile strength, density, thickness, rigidity to bend, rigidity to shear and extensibility have great impact on seam quality [10]. In other study, researcher observed that, the seam strength and efficiency increase when the stitch density increases [11]. Researcher Nasif found that, the seam strength, seam efficiency and seam elongation decrease with the increase of needle size. In the study, approximately 5% tensile strength of seam is reduced with the increase of needle size from 12 to 16 [12]. Some researcher analyzing the seam strength considering the characteristics of PES-PTFE air-jet-textured sewing

threads. Seam breaking force for the PES-PTFE threads depends directly on the manufacturing parameters and maximum breaking force is obtained using core threads overfeed and mean air pressure [13]. The existing studies about seam strength does not consider the thread count. Specific seams are suitable for particular fabrics because each fabric has its own unique properties. As fiber content and thread count play a role in seam strength and hence garment quality. So, this study is planned to investigate the effect of sewing thread count on the seam strength.

2. Methodology

The analysis of seam strength was carried out on a woven fabric having construction of EPI: 75, PPI: 42, Warp count: 10 Ne and Weft count: 8 Ne. Then, the samples have been prepared according to ISO 13935-2:1999 method. The fabrics were sewn by using two types of stitch namely lock stitch 301, chain stitch 401 using three types of sewing thread (Count:20/2 Ne, 20/3 Ne & 40/2 Ne). After that, seam strength of all the samples have been tested using seam strength tester. Finally, the seam strength reports are collected from the machine.

3. Result & Discussion

In this research work, seam strength of a superimposed seam having different sewing thread count has been measured. The results are summarized below:

Table 1. Comparative study on seam strength based on seam & stitch type.

Stitch types	Sewing thread count	Observations	Seam strength of Warp (N)	Avg. seam strength Warp (N)	Observations	Seam strength of Weft (N)	Avg. seam strength Weft (N)
301	20/2 Ne	1	150.63	130.75± 15.17	1	114.42	125.07± 15.77
		2	133.41		2	122.78	
		3	124.39		3	116.90	
		4	119.09		4	124.69	
		5	126.22		5	146.55	
	20/3 Ne	1	415.54	400.39± 16.19	1	123.30	130.79± 12.58
		2	387.61		2	118.59	
		3	396.69		3	139.63	
		4	389.33		4	142.13	
		5	412.78		5	130.29	
	40/2 Ne	1	143.48	144.2± 8.22	1	104.03	119.06± 16.67
		2	145.85		2	118.06	
		3	133.19		3	107.92	
		4	149.42		4	133.79	
		5	149.11		5	131.52	
401	20/2 Ne	1	144.67	138.14± 13.14	1	113.09	117.52± 16.03
		2	140.74		2	118.41	
		3	126.89		3	130.17	
		4	150.85		4	127.90	
		5	127.56		5	98.01	
	20/3 Ne	1	400.29	350.34± 71.19	1	163.91	148.92± 20.43
		2	371.14		2	123.83	

	3	389.75		3	150.19	
	4	258.92		4	163.12	
	5	331.60		5	143.53	
40/2 Ne	1	275.25	296.51±	1	142.23	145.03±
	2	311.08	49.82	2	120.94	20.82
	3	265.60		3	155.33	
	4	269.86		4	141.16	
	5	360.78		5	165.49	

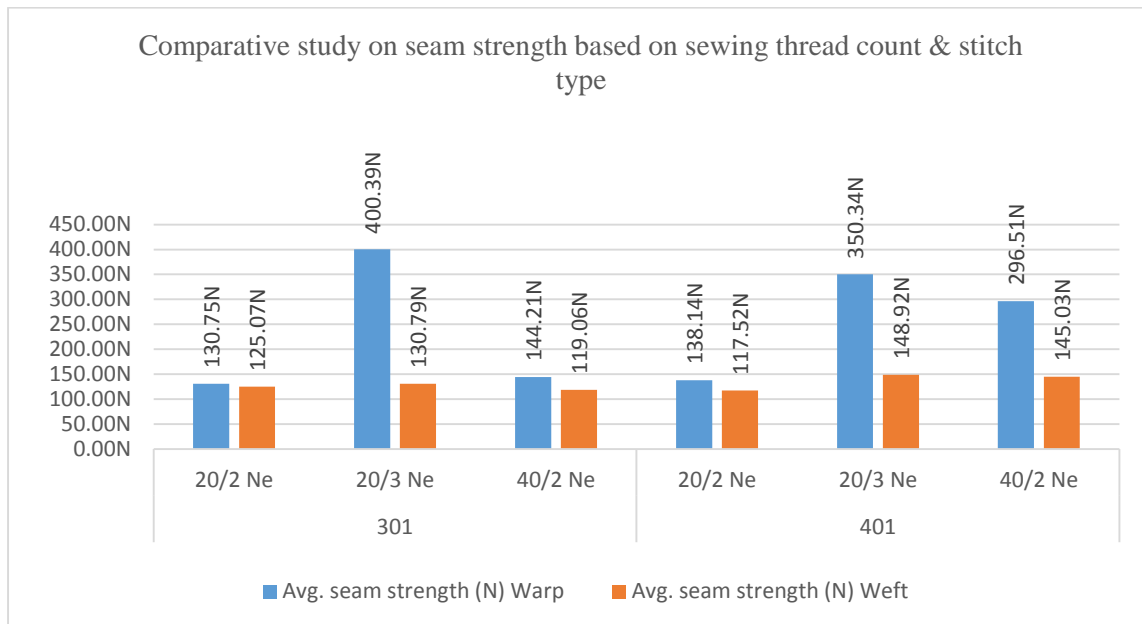


Figure 1. Comparative study on seam strength based on sewing thread count & stitch type.

Table 1 & figure 1 illustrate a comparative study on seam strength based on seam & stitch type. Average seam strength value of warp in case of single needle lock stitch stood at 130.75N for 20/2 Ne sewing thread. Which increased significantly to 400.39N in case of 20/3 Ne lock stitch, followed by the lowest value 144.21N for 40/2Ne lock stitch seam. On the other hand, average seam strength value of weft in case of single needle lock stitch stood at 125.07N for 20/2 Ne sewing thread. Which increased steadily to 130.79N in case of 20/3 Ne lock stitch, followed by the lowest value 119.06N for 40/2Ne lock stitch seam.

However, for chain stitch; the seam strength value stood at 138.14N and it dramatically increased to 350.4N. Finally, it fell steadily to 296.5N for 40/2Ne chain stitch seam. But for weft seam, the seam strength value stood at 117.52N and it dramatically increased to 148.92N. Finally, it slightly decreased to 145.03N.

Overall, 20/3 Ne sewing thread has the highest value of seam strength for both lock & chain stitch and also for warp & weft seam. So, it can be said that if finer count in indirect system sewing thread is used for sewing, higher will be the seam strength. Moreover, the seam produced with chain stitch has the higher seam strength than seam produced by lock stitch seam.

4. Conclusion

From the results, it is concluded that sewing threads of various count and stitch will show different results on seam strength. Sewing thread of finer count will show higher seam strength and chain stitch

will show higher seam strength than seam produced by lock stitch. As stitch types and selection of sewing thread has a great impact on the strength of seam, so suitable sewing thread and stitch must be chosen to ensure better quality garment or end product. In addition, the seam strength should be tested to assure that it meet the ISO/ASTM standards before entering the global market to enable customers to choose the garment as per their desired quality.

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