Sewing Thread Linear Density on Lapped and Superimposed Seam

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Abstract **- This 21st century can be named as the golden era of fashion market although fashion moves by cycle. Most of the human being is very much cautious about the fashion now-a-days. Some advanced critical processes have been emerged to mitigate this enhancing demand. Besides there are so many fashion raw materials used to make these fashion garments/apparels. These raw materials have a great contribution on the apparel performance. Seam is one of the major parts of garments. In this research, it would be identified how sewing thread linear density affects the seam performances. It is a comparative research work which will deliver very effective knowledge about various types of seam, seam strength and seam performance. For this research many sample seam parts have been made and after that all samples have tested in a woven dyeing laboratory of a renowned textile industry named Thermax Ltd.**

Index Terms **- Seam, Seam Strength, Stitch, Sewing Thread Linear Density, Needle Size, Garment & Apparel**

INTRODUCTION

The apparel industry includes a diversity of fashion products, types, volumes of production and manufacturing environment, therefore, technology applied to apparel sewing increasingly demands versatility and quick response. The management of apparel manufacturers is relatively uncertain in respect of quality and with the advent of advanced technology; the relationship between the raw material properties, sewing performance and seam quality becomes very important [1]. Fabric and sewing thread is the basic raw material of apparel industry. Characteristic of the raw material influences the seam quality of the garment. The apparel designers are primarily interested in the raw material properties for high seam quality and consumer is mainly interested in appearance, comfort, and wears ability of the garment. Proper selection of raw material not only gives comfort to the wearer but also helps in smooth working of manufacturing process and lead to defect free garment [2]. Since the vast majority of seams in a garment are held together by sewing thread, it is important to recognize that 50% of the responsibility of the garment's performance is dependent on sewing thread & other parameters [3]. Sewing thread place an important role in the apparel manufacturing process. Sewing thread is usually less than1/1000 of the weight of apparel, but it carries more one half the responsibilities for its performance. Threads are used to form the stitches that hold the apparel parts together. A large variety of sewing threads is used in clothing industry. The majority of the sewing threads used by the clothing industry are made from cotton and polyester fibre [4]. Threads made from natural fibres such as linen and silk and certain manmade fibres, for example nylon, acrylic and viscose are also used in clothing industry [5]

Many factors influenced the quality of seams.
These factors can be classified into four principal origins: 1. Speed, 2. Needle, 3. Thread And 4. Fabric. It was found that fundamental interactions between these factors still exist [6]. For the purpose of making good seam, great number of techniques has been developed until today, but nothing has been as successful as sewing process. Stitch is placing the sewing materials like fabrics with in and out by needle. Different stitches and stitch types are being used for flexible materials like knitted apparels and suits; they are being used f or less flexible knitted products and for sewing relatively inflexible materials like woven fabrics as well. Despite of recent developments on automation of general set up; sewing threads are still irreplaceable material in apparel sector. The mistakes arisen from the sewing threads having been eliminated by new studies which performed by manufacturers. As a result of technological developments: smooth, steady

and strong sewing threads provide advantages for all stitch types [7]. Stitch Stitch is the configuration of the interlacing of sewing thread in a specific repeated unit. The term stitches refers both to the thread interloping or Interlocking used to make seams-the joints between two pieces of fabric that are sewn together. Stitches help determine the functional aesthetic performance of a garment. Their durability comfort and attractiveness are important performance considerations determined by the end use and design of the garment, the type of fabric used, and the location and purpose of the stitches. Cost considerations also affect the choice of stitches [8].

According to British Standard 3870 and ISO 4915, there are six classes of stitches. Class 100 chain stitches Class 200 stitches originating as hand stitches. Class 300 lockstitches. Class 400 multi-thread chain stitch. Class 500 overedge chain stitches Class 600 covering chain stitches [9]. Seam A seam consists of a series of stitches joining two or more plies of a material or materials. A seam is used for joining or assembling materials in the production of an article. A seam is the application of a series of stitches or stitch types to one or several thickness of material. Seam line is a stitch line of a seam; it is usually parallel to and always an appearance of the seams affects overall attractiveness of a garment. Straight, neat, smooth, even seams that are not twisted, ropey, or rippled contribute to aesthetics According to British Standard 3870, there are eight types of seam, Class 1 (superimposed seam) Class 2 (lapped seam) Class 3 (bound seam) Class 4 (flat seam) · Class 5 (decorative seam) Class 6 (edge neatening Seam) Class 7 Class 8 Seam Class 1 (Superimposed seam) The superimposed seam is achieved by sewing two or more separate pieces of fabric together. This is the one of the most recognized methods of seaming. The most basic superimposed seam is the SSa. One ply of fabric stacked upon another with thread stitching through all plies of fabric. SSa is used on many garment side seams. This class of seams can be sewn a variety of machines, for example a Lockstitch or Over-lock machine. The Superimposed Seam has over 50 variations [10]. The superimposed seam is the most commonly used method of seaming; however, its overall appearance can be very different when all the necessary factors have been balanced. The basic characteristic of a superimposed seam is that the seam allowance is exactly the same on top and bottom ply [8]

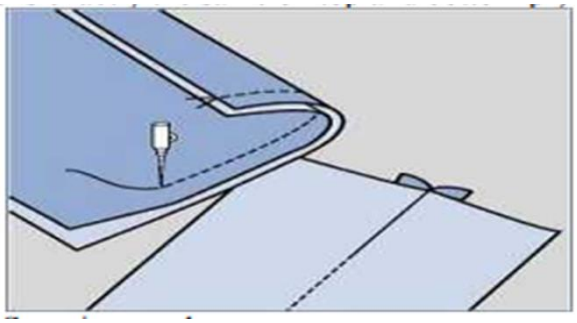

Figure 1: Superimposed seam

Seam Class 2 (Lapped Seam)

This class of seaming has the largest number of variations. A lapped seam is achieved with two or more pieces of fabric overlapping each other. LS commonly, but not always, have one ply of fabric fold under itself for a finished edge. Lapped seams are common when working with leather and sewing side seams on jeans and dress shirts [10]. The seams in this have uneven seam allowances; therefore, the pattern cutting, and garment assembly has to be performed with extra care to ensure that the garment fits together correctly. In a nutshell the seam allowance on one side overlaps the other, hence the name lapped seam [8]

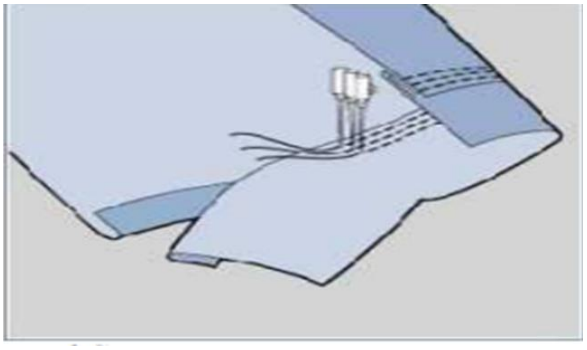

Figure 2: Lapped Seam

Seam Strength Seam strength refers to the load required to break a seam. This measures the strength and tenacity of a seam. Two pieces of woven fabric are joined by a seam and if tangential force is applied the seam line, rupture ultimately occurs at or near the seam line. Every seam has two components, fabric and sewing thread. Therefore, seam strength must result from the breakage of either fabric or thread or, in more cases, both simultaneously. Research has revealed that the load required to rupture the seam is usually less than that required to break the unsewn fabric [11][12]. Few factors that determine the strength of a seam include: · Fabric Type, Weight, Strength, Durability.

Thread Fiber Type, Construction, and Size. Stitch and Seam Construction Stitches per Inch (A&E). METHODOLOGY For the purpose of this research, different jobs have been done in different workplaces. To complete this work, the whole work has been done in three stages in three different laboratories. Firstly, apparel sewing (leg panel) has been done in Apparel Manufacturing Engineering laboratory, Bangladesh University of Textiles, then apparel dyeing has been done in apparel dyeing factory named Hams Washing & Dyeing Limited, Tejgaon I/A, Dhaka and finally apparel testing that is seam strength test has been done in a Testing Lab of Thermax Woven dyeing Limited, Norsingdi. So, this experimental work has been done in three steps as bellows: 1. Sewing 2. Dyeing. 3. Testing. Experimental Work: Sewing Sample selection: ϖ Apparel: Trouser/Pant (Leg panel) ϖ Fabric: Twill fabric, 100% cotton ϖ Sewing Thread: Two types; Tex 60, Tex 105; 100% cotton. Specifications:

Table 1: Specification of sample gabardine fabric which has been used in this experiment

Parameters	Gabardine
Material	100% cotton
Fabric Construction	Twill 1/3
Yarn, Warp/cm	52
Yarn, Weft/cm	20
Mass (gm/m^2)	217
Yarn count (warp)	20's
Yarn count (weft)	16's

Table 2: Specification of sample sewing thread which has been used for making seam in this experiment.

Tex number of sewing thread	Ticket number	Count (Ne) of sewing thread	Length (M)
60	030	30/3	5000
105	018	18/3	5000

Table 3: Different variables taken into consideration for this experimental research.

Needle size	16, 18
Seam	Lapped, Superimposed
Stitch	Class 400, class 500

Table 4: Numbering of seam with specific variable details

Sample no.	Sewing thread linear density	Stitch per Inch	Needle size	Stitch class	Seam type
1	Tex 60	13-14	16	400	Lapped seam
2	Tex 60	10-11	16	400	
3	Tex 60	7-8	16	400	
4	Tex 60	13-14	18	400	
5	Tex 60	10-11	18	400	
6	Tex 60	7-8	18	400	
7	Tex 105	13-14	16	400	
8	Tex 105	10-11	16	400	
9	Tex 105	7-8	16	400	
10	Tex 105	13-14	18	400	
11	Tex 105	10-11	18	400	
12	Tex 105	7-8	18	400	
13	Tex 60	13-14	16	500	Superimposed seam
14	Tex 60	10-11	16	500	
15	Tex 60	7-8	16	500	
16	Tex 60	13-14	18	500	
17	Tex 60	10-11	18	500	
19	Tex 105	13-14	16	500	
20	Tex 105	10-11	16	500	
21	Tex 105	7-8	16	500	
22	Tex 105	13-14	18	500	
23	Tex 105	10-11	18	500	
24	Tex 105	7-8	18	500	

Dyeing Direct dyestuff has been used. Process flow chart of Dyeing with Direct Dyestuff:

Garments Seam Strength Testing

Table 1: Effect of Sewing Thread Liner Density (Tex) on Seam Strength for Lapped Seam

Sewing Thread Tex	Sample no	Undyed Lapped Seam strength in Newton(N)	Dyed Lapped Seam Strength in Newton(N)	Loss of seam strength in percent	Average Strength Loss %
60	1	218.3	201.9	7.5	6.63
	3	198.5	188.3	5.1	
	5	173.8	161.1	7.3	
105	13	225.6	207.3	7.8	7.83
	15	201.5	187.6	6.8	
	17	187	170.3	8.9	

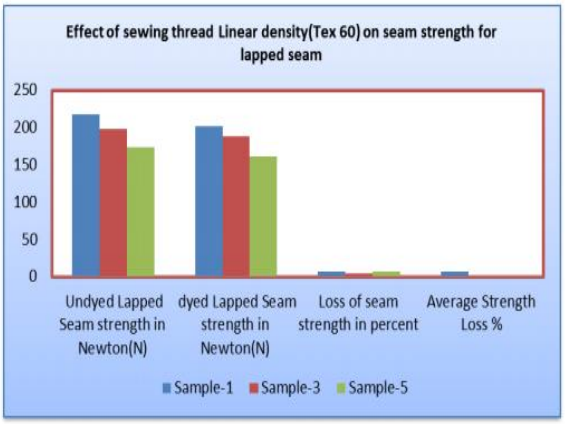

Figure 3: Effect of Sewing Thread Liner Density (Tex 60) on Seam Strength for Lapped Seam

In this figure 3, X axis shows samples 1, 3, and 5 gradually. Y axis shows the value of undyed lapped seam strength, dyed lapped seam strength, loss of in this figure 4, X axis shows samples 13, 15, and 17 gradually. Y axis shows the value of undyed lapped seam strength, dyed lapped seam strength, loss of seam strength in percent and average seam strength percentage.

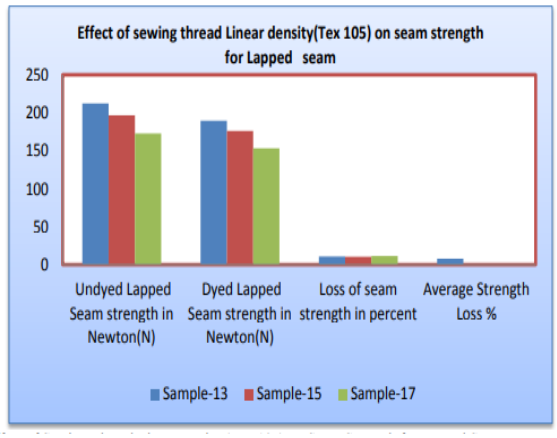

Figure 4: Effect of Sewing Thread Liner Density (Tex 105) on Seam Strength for Lapped Seam

Superimposed Seam

Table 2: Effect of Sewing Thread Liner Density (Tex) on Seam Strength for Superimposed Seam

Sewing Thread Tex	Sample no	Undyed Superimposed Seam strength in Newton(N)	Dyed Superimposed Seam strength in Newton(N)	Loss of seam strength in percent	Average Strength Loss %
60	25	212.3	189.5	10.8	10.83
	27	196.7	176.2	10.4	
	29	172.8	153.2	11.3	
105	37	222.6	193.5	13	12.4
	39	200.2	179.8	10.1	
	41	176.9	151.8	14.1	

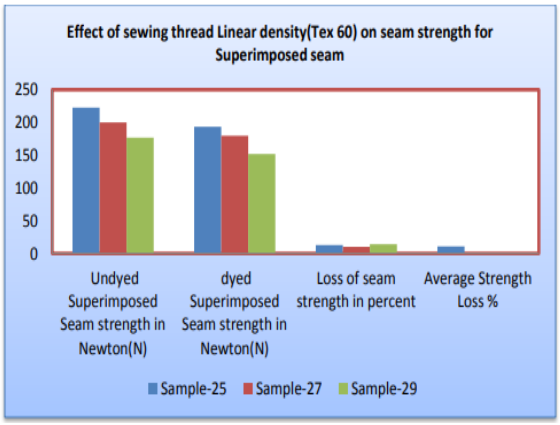

Figure 5: Effect of Sewing Thread Liner Density (Tex 60) on Seam Strength for Superimposed Seam

In this figure 5, X axis shows samples 25, 27 and 29 gradually. Y axis shows the value of undyed superimposed seam strength, dyed superimposed seam strength, loss of seam strength in percent and average seam strength percentage.

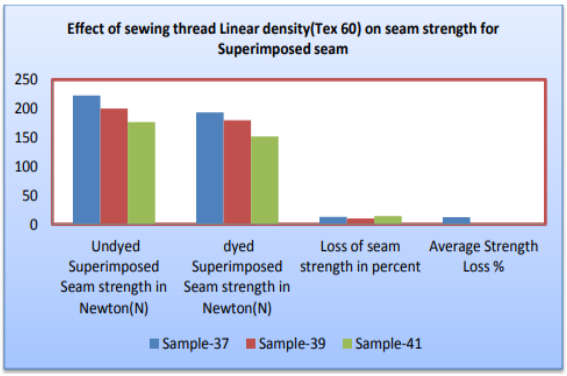

Figure 6: Effect of Sewing Thread Liner Density (Tex 105) on Seam Strength for Superimposed Seam

In this figure 6, X axis shows samples 37, 39 and 41 gradually. Y axis shows the value of undyed superimposed seam strength, dyed superimposed seam strength, loss of seam strength in percent and average seam strength percentage.

DISCUSSION

Lapped Seam Sewing thread linear density Tex 60 shows better result than Tex 105

CONCLUSION

By this study, it is clearly found that seam strength of dyed apparels decreased. It is because of the apparels pass through various stages in manufacturing

procedure. Here lapped seam strength loss is lower than superimposed. Moreover, seam strength for both lapped and superimposed seam has been found Super imposed Seam Sewing thread linear density Tex 60 shows better result than Tex 105. better for Tex60 than Tex105. Different factors of sewing influence the seam strength on dyed apparels individually. The performance of apparels mainly depends on seam and stitch as well as different sewing factors. So it is very needed to make apparels with appropriate sewing factors especially for dyed apparel. Further research may be done on how to enhance the seam performance with both Tex60 & Tex105 alongside of any other sewing factors.

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