Influence of Fabric Type on Seam Performance – A Review

Jyothirmai S, S. Amsamani

Abstract: ***The present-day consumer is looking for durability, and comfort in apparel. Sewing is the most used technique to convert two-dimensional fabric into 3-dimensional apparel. Seam performance is an important factor to achieve the durability and comfort of the apparel. Seam efficiency depends not only on sewing parameters but also on fabric type. Ideal combinations of both are important to achieve perfect seam performance and efficiency. How different fabrics perform to specific sewing parameters were reviewed.***

Keywords: Seam performance, seam efficiency, seam strength.

I.INTRODUCTION

Sewing is the crucial manufacturing technique used to convert 2-dimensional fabric pieces to construct 3-dimensional apparel. Over the last few years fit, comfortability, and overall quality of apparel have taken a front seat in the apparel industry. Buyers are looking for apparel which exactly fits their body shape, which gives comfort, durability, serviceability of the apparel along with aesthetic visibility of the garment. The fit of the apparel is correlated to the comfort of the apparel. Elasticity of the seam depends on sewing thread type, Stitch type, stitch density, and, seam type which in turn affect which in turn effects the fit of the apparel. Choosing the correct parameters based on the fabric chosen to be stitched is very important to achieve the desired fit and comfort of the apparel. Some of the industries are ignoring this basic factor and not able to achieve at most important quality buyers are looking for, wiz., fit, and comfort of apparel. [7].

"The functional and the aesthetic performance of an apparel product in terms of durability and stability are affected by seam strength". [8].

II.FACTORS INFLUENCING THE STRENGTH OF A SEAM

A. Stitch density:

Is the number of stitches per inch (SPI). Stitches in the 6–8 per inch range convey a more primitive quilting style, suitable for utility quilts stitched using heavy threads. Stitches 10–12 per inch yields the best stitch quality in most commonly used apparel.

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B. Thread Tension:

Improper thread tension relates to the uneven seam which in turn affects seam quality. Ideal thread tension can be achieved by matching the thread type with the needle is important. For example, a heavy-duty thread matched with tiny needle results in improper thread tension. Due to high thread tension and there is a chance of broken thread results in skipped stitches. Other factors influence thread tension is the maintenance of the sewing machine and the quality of the sewing thread. [13]

C. Stitch Depth and Width:

The distance between a stitch's upper and lower surfaces is called as stitch depth and the distance between the lines of the outermost parts of the stitches is called stich width. Few types of stitches like lock stitch have only stitch length, not the width. Whereas overlock and zig-zag stitches have both stitch length and width. Manufactures consider stitch to be used based on apparel. sometimes a combination of stitches will be used to achieve greater seam strength. [11].

D. Seam allowance:

"Seam allowance is the area between the edge and the stitching line on two or more pieces of material being stitched together." [4]. A 1.5 cm ($5/8^{th}$ inch) seam allowance is generally considered a standard. However, approximately 0.6cm ($1/4^{th}$ inch) is the most practiced seam allowance for curved areas, such as necklines or armholes. In areas where extra fabric is needed for the final fitting alterations for the wearer, seam allowances can be 2.5cm (1 inch) or more.

E. Seam elasticity:

Seam elasticity has become more important in recent times. "Increasing the stitch density helps to increase stitch extensibility. An improvement in the stretch performance of a seam can be achieved by a balanced stitch." [7].

III.SEAM PERFORMANCE:

Seam performance refers to strength, elasticity, durability, security and comfort, and maintenance of the garment. "Seams must be as strong as the fabric, in directions both parallel and at right angles to the seam. They must also stretch and recover with the fabric. Good appearance in a seam normally means smooth fabric joins with no missed or uneven stitches and no damage to the fabric being sewn." [6].

The seam performance depends on

- Strength
- Aesthetic appeal
- Extensibility
- Durability

- Ease of assembly
- Security
- Comfort in wear

Seam efficiency is the ratio of apparel seam strength to actual fabric strength

"Seam efficiency = 100 × (Seamed fabric strength / Unseamed fabric strength)" [7],[12].

An optimum combination of fabric, sewing thread, sewing parameters, and the well-maintained machine gives great seam performance. A comparative study between plain weave cotton, polyester, and silk conducted by Seetharam and Nagarajan (2014) concluded that polyester fabric is found to have higher seam strength and extension characteristics as compared to cotton and then silk.

A study conducted by (Islam *et.al* 2018) comparing plain, twill and satin weave cotton fabrics stitched with different thread types in terms of liner density seam efficiency is increased with the increase of sewing thread linear density because more fibers are incorporated in the coarser thread for the same fabric. Seam efficiency varies at the same sewing thread linear density for different fabrics due to the properties of the fabric. The seam efficiency of plain fabric is better than other fabrics at the same sewing thread linear density because of more binding point in the plain fabric than other fabric. Another reason is the more yarn per inch of the plain fabric than other fabrics. Here seam strength, as well as seam efficiency of satin fabric, is very poor due to dimension instability and less binding point than other fabric but bound seam is quite good at higher sewing thread linear density.[8]

Lightweight fabrics are selected for their aesthetic qualities, drape, and handle A study conducted by Khaled *et.al* (2018) on seam performances on lightweight woven fabrics, chiffon, and satin mentions seam performance significantly changes with the use of different types of stitches and stitches per inch.[10]. Seam performance greatly depends not only on sewing parameters like type of sewing thread, stitch length, needle size, thread tension, and stitch type but also on structural fabric parameters affect the behavior of material such as its density, weft and warp fineness, weave type, fabric mass per unit area [1], [5]. As part of honors thesis Courtney LaPere (2006) conducted a study on "The Effects of Different Fabric Types and Seam Designs on the Seams Efficiency" using Cotton, silk and wool concluded that although wool was the weakest fiber among the three used in the study, the wool fabric produced the highest breaking load because it was the heaviest fabric. The highest seam efficiency was found in cotton followed by silk and wool.[3] Though all these are cotton fabrics it doesn't mean seam efficiency is similar to the same seam parameters. A study was conducted on different kinds of commercial cotton fabrics, Fil- A- Fil Oxford, Poplin, Flannel (Both side brushed), and Mohammad Jaber and Md. Mazharul Islam (2019). concluded that each seam performance changes based on SPI and SPI is different for different fabrics.[9]. Cheng and Poon, (2002) conducted a study on seam properties in Plain weave, 2/1 Twill weave, and 3/1 Denim fabrics and concluded that factors other than sewing parameters which affect seam strength and seam pucker include fabric weave, fabric weight, fabric thickness, and seam direction. Plain weave fabric has higher seam strength and greater seam pucker than twill weave. The heavier and thicker the fabric, the higher the seam strength and the lesser the seam pucker.[2]

IV.CONCLUSION

It is evident that an optimum combination of fabric and sewing parameters are essential to achieve perfect seam performance. Industries mainly focus on seam parameters but not in combination with the type of fabric and fabric structure which greatly influences seam performance and provides desired apparel for consumer satisfaction.

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