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RESEARCH ARTICLE

A Comparison between Bonding and Sewing: Application in Sports Performance Wear

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Abstract

To achieve innovative garments, apparel industry need to be experiment and evaluate the available alternative technologies to identify the applicability and adoptability as to replace the traditional sewing techniques though sewing with needles and threads is the main joining method. This study focuses to compare the application of the traditional sewing and the modern bonding technique which is not widely used at present, though it is beneficial not only to enhance the value of the performance wear but also to replace as a reliable alternative to traditional sewing techniques. Seams were produced and the testing was conducted to evaluate the seam strength. Though it was evident that both the sewing and bonding are very strong joining techniques, it can be concluded that bonding method is more reliable than sewing for constructing sports performance wear with respect to the seam strength. However, both methods can be recommended as suitable techniques for the seam construction in sports performance wear.

Keywords: Garments, apparel industry, bonding, sewing, seam, sports performance wear.

Introduction

New alternative techniques for joining fabrics were emerged with the introduction of new fabrics and finishing techniques of textiles. Researchers (Laing, 1998; Jones and Wise, 2005; Jana, 2011) acknowledged three main forms of the alternative assembly techniques based on their application.

- Fusing–Heat is applied to fuse resin on one side of the substrate.
- Adhesive seaming–An adhesive is applied to the two surfaces to be joined. Seaming may take place with the application of heat (which is the more common process) or with the application of light pressure.
- Welding–Melting of either one (single welding) or both plies is followed by application of pressure and a cooling period.

Bonding, the pertained technology for this study, is identified as an alternative for sewing or joining the fabric pieces together in apparels. There are several methods for constructing a bonded garment, depending on the specific application or the desired design. Bonding can be classified as thermal, ultrasonic, area, point, through-air, adhesive and radiant bonding (Laing, 1998; Hopkins, 1990; Dharmadhikari *et al*., 1995). Although the apparel industry interests on alternative techniques for producing high quality garments, the usage of bonding as a new technology is less prominence in comparison to traditional stitching especially in sports wear manufacturing. Sri Lankan apparel manufacturers also use adhesives and bonding technology only for decorative purposes and currently the application of bonding for manufacturing of sports performance wear is considerably low.

Considering the possibility of achieving seams with clean finished, there is an opportunity of replacing traditional sewing method with bonding technique. Thus, this study focuses to compare the application of the traditional sewing and the modern bonding technique which is not widely used at present though it is beneficial not only to enhance the value of the performance wear but also to replace as a reliable alternative to traditional sewing techniques.

Materials and methods

Experimental design: The study was planned to carryout in two phases. The focus of the first phase was to evaluate the possibility of constructing the different seam types. 'Experimental reflective practice' was used as the main method for the practical investigation. The basis for analysis was formed by reflections made during and after the experimentations to analyze the possibility of making selected different seam types. In the second phase of the study, strength testing was conducted using industrial standards to assess the strength of the constructed seams.

Constructing different types of seams: Considering the end application, four different types of fabrics which were available and used in the apparel industry was selected for this study. For this particular study, Plain seam, French seam and Lap seam were produced with four different types of fabrics. Adhesive bonding and sewing technology (lockstitch) were used to make the seam samples. Possibility of using bonding and stitching for seaming sports performance wear was evaluated.

Table 1. Possibility of constructing different seam types.

Seam category	Seam type	Possibility of bonding	Possibility of needle stitching
Super-imposed seam	Plain seam–SSa	Possible	Possible
	French seam–SSe	Possible (more thicker)	Possible
Lap seam	Lap seam–LSc	Possible	Possible

Table 2. Seam strength behavior of plain seam (test reports).

Seam type	Composition	Fabric IM	Bonded (adhesive) strength KGF 2.5	Sewing strength KGF 2.5
Plain seam	100% Cotton	363255 6F ANTHRA	25.68	9.69
	100% Poly	441223 DGHTR	46.72	1.96
	12% Spandex 88% Poly	309377 BLUE/421976 BLACK	32.85	2.54
	12% Spandex 88% Poly	470426 BLACK	52.19	1.94

Table 3. Seam strength behavior of French seam (test reports).

Seam type	Composition	Fabric IM	Bonded (adhesive) strength KEF 2.5	Sewing strength KEF 2.5
French seam	100% Cotton	363255 6f ANTHRA	41.77	5.07
	100% Poly	441223 DGHTR	52.05	3.08
	12% Spandex 88% Poly	309377 BLUE/421976 BLACK	52.05	34.53
	12% Spandex 88% Poly	470426 BLACK	52.05	3.42

Evaluating seam properties: Basically, seam strength depends on four factors: fabric, type of seam, needle and sewing yarn. Burton-wood and Chamberlain (Chmielowiec, 1987) acknowledged three main reasons for seam failure; due to thread breakages, due to fabric breakage and due to thread and fabric breakage. To check the seam properties, seam strength test (Nike shear strength test) was conducted in a laboratory condition.

Results and discussion

Possibility of constructing different types of seams: The possibility of constructing different types of seams with the use of adhesive bonding technology and the stitching with lockstitch machine was evaluated. It was clearly evident during the process that plain seam, French seam, lap seam and bound seam can be constructed using adhesive bonding technique. The seaming was successful for the four selected fabrics (Table 1).

Seam strength of the tested seams

Behavior of Plain seam: Majority of samples of the different types of fabrics used for the study had shown good results (Table 2). No bond failures and fabric ruptures were evident. However, results had indicated some fluctuations for sewn samples within some of the fabrics. This may be mainly due to the human errors during stitching process and the quality of the yarns used for stitching. On the other hand, the utilization of lockstitch which is more suitable for non-stretch than stretch materials for stitching may affect for the above discussed results.

The results may be improved or changed if the sewing has done with the use of chain or over lock stitching. Almost 100% cotton fabric had shown the lowest strength than the rest of the fabrics. However, bonded seaming has proven as the strongest seam method in constructing plain seam showing the highest strength results for all the tested samples.

Behavior of French seam: The result had shown some differences within the different fabric types. It is evident that all the bonded seam samples had achieved very high values while the sewn seams had shown a low seam strength values (Table 3). Seam strength behavior of French seam constructed with bonding technique is much more reliable than sewn. No bond failures and fabric failures were seen during the testing process. In sewn seams, mostly the fabric failures were seen and there were some stitch failures too. The 309377 Blue 421976 black sewn seams had shown very similar values in two samples. The results had proven that, 309377 blue 421976 black was the best for constructing bonded French seam out of the four fabric types. The 12% spandex, 88% polyester fabric was one of the most suitable fabrics for constructing French seam with stitching.

Behavior of Lap seam: Bonded lap seams had shown high strength values in all the fabric used for the study. However, it is clearly visible that the sewn lap seams had failed in seam strength test. Out of the used fabrics, 100% cotton fabric had shown the lowest bonded seam strength (Table 4).

Table 4. Seam strength behavior of lap seam (test reports).

Seam type	Composition	Fabric type	Bonded (adhesive) strength KGF 2.5	Sewing strength KGF 2.5
Lap seam	100% Cotton	363255 6F ANTHRA	19.79	12.29
	100% Poly	441223 DGHTR	40.08	13.26
	12% Spandex 88% Poly	309377BLUE/421976 BLACK	30.68	12.26
	12% Spandex 88% Poly	470426 BLACK	50.38	9.18

Conclusion

From this study, it can be concluded that not only the type of fabric and the fabric composition but also the type of technology used for the construction of seams effects for the seam strength. It is clearly visible that though the strength of sewn seams was also strong, their values were lower than the bonded seams. Further research may be carried out to investigate the behavior on a wider range of fabrics in terms of compositions, structure and weight. In this study, it was evident diverse behaviors for different types of fabrics. Almost 100% polyester and 12% spandex, 88% polyester fabrics can be recommended as the most suitable for bonded flat seam and bonded plain seam whereas 100% polyester, 12% spandex, 88% polyester fabrics as the most reliable for bonded French seam. Moreover, the results has proven that 100% polyester fabrics are most reliable for sewn French seam and other fabrics especially 100% cotton are not suitable for sewn plain seam and flat seam since the fabric and stitch failures were evident. In terms of the strength of the seams, the result shows that the bonded seam is the most reliable technique for constructing seams. Though the cost of the product is considerably high, the feeling of low friction can be offered to the wearer. However, stitching is more convenient than bonding in terms of operation cost and total processing time which can be used to earn profit. It could be interesting to extend this study further for chain stitch (single needle and double needle) and over lock stitching (three threads, four threads and five threads) with respect to the seam application of the sports performances wear. Moreover, the research can be further explored with the changing of the settings of the bonding machines such as speed and pressure depth. If the industry really wishes to promote the feeling of low friction to the wearer, as to enhance the value catered to customer, garment bonding can be recommended as one of the most suitable techniques to construct sports performance wear.

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