

가공방법에 따른 투습방수직물의 심 퍼커링 거동

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Seam Puckering Behavior of Breathable Waterproof Fabrics with Various Finishing Methods

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1. Introduction

Garment manufacture represents the final stage of processing a finished fabric. The main task of the garment manufacturer is to produce shell structures out of flat fabrics to match the shape of the human body, and the most acceptable means of joining textile materials for apparel use is by sewing. On the sewing process, the bottom layer is pushed forward by the feed-dog, but the presser foot tends to retard the passage of the top layer. Since the friction between the layers is low, it is possible that the components will move out of phase and pucker. For several decades, many methods for evaluation of seam pucker have been reported using new technology. In recent years, a number of new attempts were made in which CCD cameras[1] or laser scanners[2] were used to capture the image of a seam, and artificial intelligence was applied to establish the relationship between the objectively measured parameters and subjective grades.

In this study, we evaluated the seam puckering behavior of various kinds of breathable waterproof fabrics with laser scan. Most of breathable waterproof fabrics were manufactured by coating and laminating process, so a lot of problems in tailoring performances were found. Various mechanical characteristic values related with seam puckering behavior were evaluated, and the significant changes were analyzed and compared with different breathable waterproof finishing.

2. Experimentals

2.1. Materials

Twenty-two breathable waterproof fabrics which are commercially used to sportswear and foul weather garments were chosen. The coated fabrics were manufactured by direct coating and the laminated fabrics were composed with base fabric, PTFE membrane, and knitted lining, and these materials combined through adhesives sprayed between the base fabric and the PTFE membrane. The unfinished fabrics were also used for comparison with the finished ones in this study.

2.2. Judgement of Seam Pucker Grade

We measured seam pucker with laser scanner for measuring seam pucker of fabrics (KD03, D&M Technology, Korea). The new standards were used with the shape parameters[3]. The parameters and AATCC grade were calculated by the system.

3. Results and Discussion

AATCC method has generally been used to evaluate seam puckering, but this method has a

trouble of deviation between operators. A simulator was developed to construct the artificially intelligent machine for evaluating seam pucker[3], and the objective system was used to evaluate the seam pucker of breathable waterproof fabrics in this study.

In this study, objective seam pucker test was performed for variously finished specimens. The obtained data were treated with noise filtering, and Table 1 shows the mean values of shape parameters with various breathable waterproof finishings. The results of the laminating type generally showed lower wave amplitude at seam line and edge line than those of the coating type. But, its wave lengths at seam line and edge line were much longer than those of coating type. The amplitude and the wave length at edge line were twice as large as those at seam line. The waves are generated on the seam line, and propagated to the edge line in the perpendicular direction to the seam line. Compared to actual clothing, the sample used in this study was so narrow, of which size was 100mm in width. It could be more severe on the wave length and amplitude in actual clothing. Figure 1 shows the trend of AATCC seam puckering grade with various finishing methods, and Figure 2 shows the real puckering photographs. As mentioned above, the grade of laminating type was generally much higher than that of the coating type, that is, the laminating type showed the lower pucker.

The seam pucker can be classified to four of tension pucker, inherent pucker, thread/shrinkage pucker and feeding pucker[4]. We confirmed that the puckering in breathable waterproof fabrics is mainly occurred by inherent and feeding pucker. The former is due to the insertion of sewing thread and the latter is caused by differential feeding when two pieces of fabric are fed into the gap between a press foot and needle plate.

Table 1. Shape parameters with breathable waterproof finishings by converted neurofuzzy engine

finishing methods	start amplitude(mm)	end amplitude(mm)	start wave length(mm)	end wave length(mm)	no. of random point
Wet coating A	4.00	8.19	38.23	79.76	3.13
Wet coating B	4.00	9.42	34.13	53.48	4.94
Dry coating A	4.00	9.79	40.86	76.02	4.39
Dry coating B	4.00	8.25	33.93	56.48	3.00
2 layer laminating	3.76	7.22	45.40	95.65	2.97
3 layer laminating	3.39	5.35	57.69	104.93	2.62

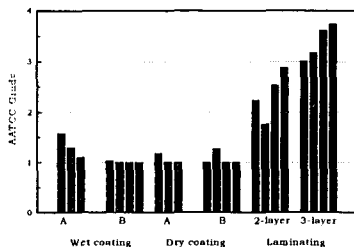
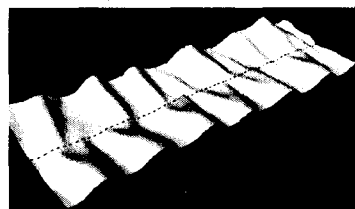
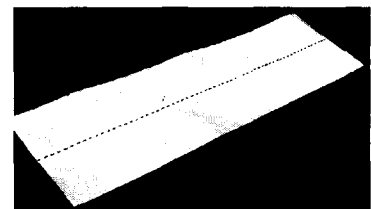


Figure 1. AATCC grade with various breathable waterproof finishings.



(a)



(b)

Figure 2. Reconstructed three dimensional model of laminating type in breathable waterproof fabrics; (a) wet coating B type, (b) 3-layer laminating type.

4. References

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