A Study on Production Technology of PET Spun Yarn and Fabric Development by Using Spinning and Texturing Technologies

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1. Abstract

This study was performed to develop a new PET yarn having the new appearance and touch effect of polyester (PET) yarn, using spinning and texturing technologies. The spinning technology is the manufacturing technology resulting in the denier difference in yarn filaments, and the texturing technology is the texturing conditions leading to spun yarn effects, using the filaments from the spinning processing.

2. Introduction

In Korea, the new synthetic fabric materials, such as wool-like, silk-like and cotton-like materials similar to natural fabric, were developed using both spinning and texturing technologies. However, the Korean textile industry has been forced to reduce the production cost and develop a high value-added fabric, due to increased competition among international textile market. Therefore, this study was conducted to develop a new PET fabric having an appearance similar to cotton, by using spinning and texturing technologies.

3. Experimental Methods

3.1 Reagents and materials

Table 1. Experiment conditions for spun yarn production (Spun DTY 75/48)

Sample	PET Spun DTY 75/48							
	Coarse/fine ratio=5:5				Coarse/fine ratio=4.5:5.5			
Process parameters	S 1	S 2	S 3	S 4	S 1	S 2	S 3	S 4
Yarn speed (m/min)	400				400			
Draw ratio (DR)	1.05, 1.10				1.05, 1.10			
Velocity ratio (VR)	1.35, 1.55				1.35, 1.55			
1st heater temperature	170				170			
Interlace air pressure (bar)	2.0				2.0			
Belt angle (。)	110				110			

The experimental conditions shown in Table 1 aim to examine the processing conditions available to achieve spun effects when the PET spun DTY 75/48 fabric is manufactured using the PET SDT 7548 yarn with different sectional forms and five-time denier per filament after going through the frictional belt-twisting process. To achieve the aim, the physical properties, appearance and yarn flyer number of the twisted yarn were analyzed to find the optimum conditions, by changing the draw ratio, velocity ratio and 1st heater temperature as shown in the table. Then, a fabric was manufactured using the yarn produced in the optimum conditions and its functionality and touch was analyzed and evaluated.

3.2 Test of physical properties

The test of physical properties was performed by measuring fineness, strength, expansion, yarn flyer number and moisture & heat shrinkage, according to test standards specified in the KS K, as well as measuring the dynamic properties, hand values, peeling and surface of the fabric.

3.3 Results and discussion

It was shown that sample 2, 4, 6 and 8 from the draw ratio of 1.1 had more yarn flyers than samples from 1.05, and that six-time difference in fineness had some more yarn flyers. Also, the samples manufactured under the condition of 1.35 velocity ratio had more yarn flyers than those under 1.50 ratio, when the draw ratio was same. When the change in breakage tensile strength was analysed in accordance with the change in twisting conditions and difference in fineness of the spun DTY 75/48, the strength under the condition of 1.10 draw ratio was 0.7g/d lower than that under 1.05 ratio. Also, it was found that the

breakage strength in the condition of 1.10 was approximately 3.5g/d, and that the strength in 1.05 was 4.2g/d. The difference in the breakage strength was not significant compared to the difference in fineness. When the flexibility and surface property of the fabric made from sample 1 and general cotton fabric were compared and analyzed, it was found that the flexibility of the fabric from sample 1 was approximately 0.027-0.030 which was similar to the general cotton fabric, and that its surface property also had MIU and MMD values similar to the general cotton fabric.

4. Conclusion

This study was conducted to develop a new PET yarn with better appearance and touch effects by means of spinning and texturing technologies with different fineness.

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