

## **The Physical Properties of ATY Textured Spun-like Cotton Yarn**

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### **1. INTRODUCTION**

"Singosen" using polyester has shown a big progress especially in the development of wool-like texture together with the advancement of silk-like texturing and conjugated texturing techniques.

The manufacturing technique development of spun-like cotton yarn, which has been used as fiber material for such a long time due to the excellence in exterior appearance, comfort and durability, is still unsatisfying.

Therefore, to satisfy customers' necessities in everyday living environments, "Shari" pattern and cotton-like "noil" should also be produced.

In this research polyester(FDY) is used as raw material, and natural cotton yarn-like noil is processed through a texturing machine of the ATY company to produce spun-like cotton yarn. The main purpose of this research is to check and compare the characteristics of the produced spun-like cotton yarn.

### **2. EXPERIMENTAL**

#### **2-1. Raw material manufacturing**

To manufacture spun-like cotton yarn holding moisture absorption function, shaped fiber(50d/36f DTY) with moisture absorption function was used as "Core" fiber and 100d/192f FDY produced by the S company was used as "Effect" fiber. Through this processing, 150d/228f(ATY) spun-like cotton yarn was produced.

#### **2-2. Twisting and doubling**

Manufactured raw material 150d/225f yarn was twisted by 700T/M and 1000T/M respectively, and then, 300d/456f yarn was manufactured through twisting 150d/225f yarn in the doubling of 700 T/M and 1000 T/M.

#### **2-3. Physical properties of spun-like cotton yarn**

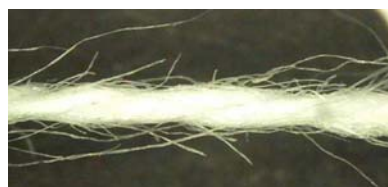
##### **1) Shrinkage**

After raw material of 30C cm length was treated in boiling water for 20 minutes, shrinkage was checked. Considering post-processing after the manufacturing process, we calculated shrinkage after

treating the raw material measured in boiling water in the conditions of 120°C, 140°C, 160°C and 180°C dry heat temperature, and 5, 10, 30 and 60-minute time variations without any tension, respectively.

##### **2) Strain stress and initial modulus**

Strain stress and initial modulus were calculated in S-Scurve.



**Fig. 2 Natural cotton yarn**



**Fig. 3 Photograph of spun like cotton yarn(700/TM)**

Fig. 3 shows the surface photograph of manufactures raw material with an ATY texturing machine. This shows that noil on the yarn surface was formed like natural cotton of Fig. 2.

#### **2-4. Woven manufacturing**

We manufactured woven by using spun-like cotton yarn(150d/228f ATY, 300d/4546f ATY)

### **3. RESULTS AND DISCUSSION**

Shrinkage (Fig. 6) on twisting shows little difference in variation. About 11% change appeared in 30-minute treatment at 180°C and about 7% change appeared in 30-minute treatment at 120°C, respectively

Tenacity (Fig. 7) on twisting showed little change in low temperature degrees, but a little high change in high temperature degrees. Tenacity in 30-minute and 180 °C treatment condition was 0.032kgf/denier for twisting 700 T/M, and 0.031 kgf/denier for twisting 1000T/M. But, tenacity in 120 °C and 30 minutes was same regardless of twisting levels.

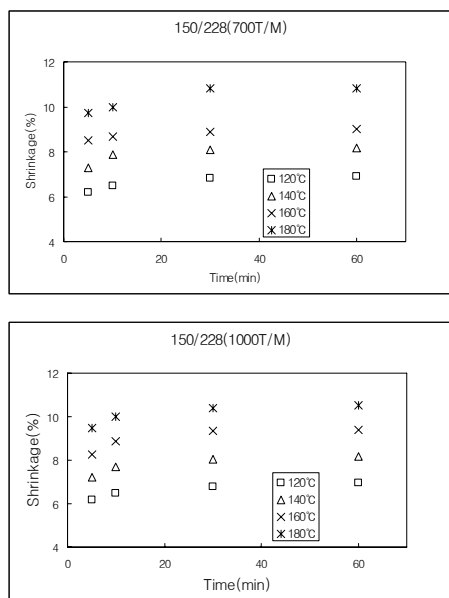


Fig. 6 Shrinkage vs. treated time at various temperature(150d/228f)

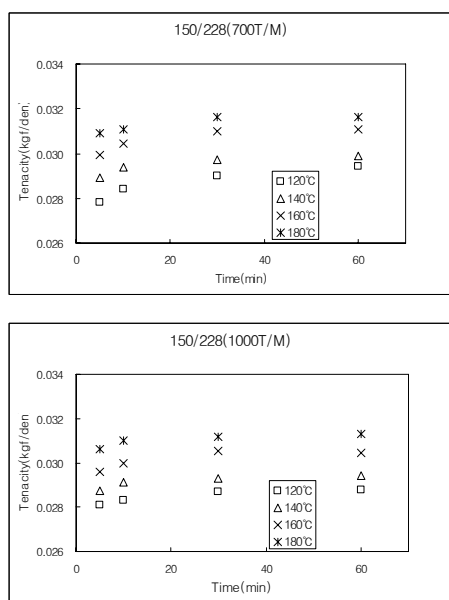


Fig. 7 Tenacity vs. treated time at various temperature(150d/228f)

In shrinkage(Fig. 10), 1000T/M twisting showed higher than 700T/M. In addition, shrinkage was affected more by temperature than by treatment time.

Shrinkage change in the twisting 1000T/M condition appeared high between treatment temperature 160 °C and 180 °C.

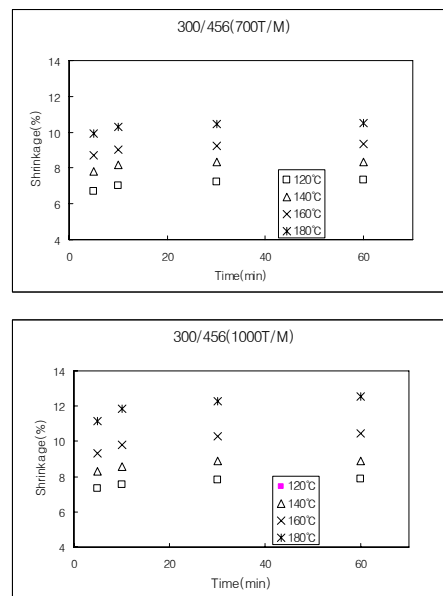
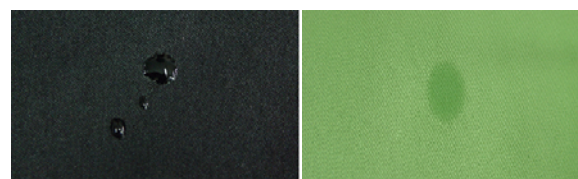


Fig. 10 Shrinkage vs. treated time at various temperature(300d/456f)



a) Un-using shaped fiber b) Using shaped fiber

Fig. 15 Photograph of surface wetting state in the fabric.

Just after spraying water on cotton-like fabric, Using shaped fiber b) case shows much higher absorption than unshaped fiber.

#### 4. CONCLUSION

- 1) For shrinkage, 150d/228f showed little change related to twisting, but 300d/456f showed higher change in 1000T/M than in 700 T/M.
- 2) For tenacity, 150d/228f showed little change in low temperature, but 300d/456f recorded higher change in 700T/M than in 1000 T/M.
- 3) For tenacity, 150d/228f recorded approximately 24% regardless of twisting in 180 °C and 30-minute treatment, but 300d/456f showed about 36% in 1000 T/M and about 33% in 700 T/M.
- 4) In this experiment, twisting 700 T/M formed more noil than twisting 1000 T/M.
- 5) Regardless of cotton-like twisting, both formed satisfactory noil on the surface like natural cotton woven.