Twisting Characteristics according to the Changes of Linear Density of Cotton Yarns in Magnetic Levitation Spindle Twisting

Choon Gil Lee

Department of Textile and Fashion Technology, Kyungil University
33 Buho-ri, Hayang-up, Gyeongsan-si, Gyeongbuk, 712-701, Korea
E-mail: cglee@kiu.ac.kr

1. INTRODUCTION

The magnetic-levitation spindle twisting technique is newly developed yarn twisting technique. Effective analysis and recognized techniques of the magnetic-levitation spindle twisting can bring about a great improvement of composition yarns.

In order to reduce the textile processes such as pirn winding for further process and interlacing for yarn texturing, the magnetic-levitation spindle twisting technique is required to simplify the yarn twisting process for the different physical property yarns. This system could solve the combing problem of different stiffness yarns such as the natural fibers and the synthetic fibers. It is very difficult to solve this problem in the two-for-one twisting system.

The magnetic-levitation spindle twisting technique does not restrict yarn types and yarn linear density because of the different yarn feeding system..

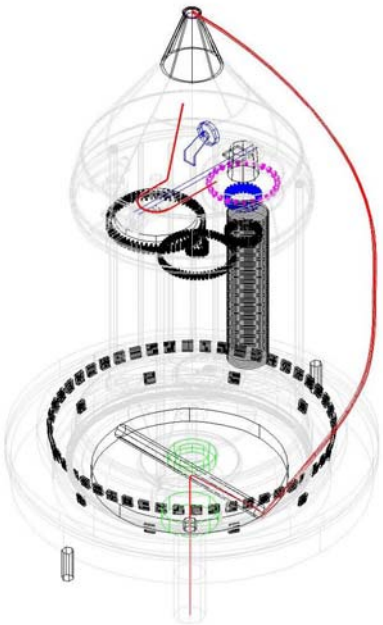

Figure 1. Yarn path in the magnetic-levitation spindle twisting.

2. EXPERIMENTAL

Structure of Magnetic-Levitation Spindle: Figure 2 shows the spindle revolution system which is consists of spindle cap and the magnetic-levitation spindle. Letting off yarns are fed in the spindle rotated by the magnetic-levitation system and overfeeding system. Figure 3 shows the shapes of the magnet in the power delivery part.

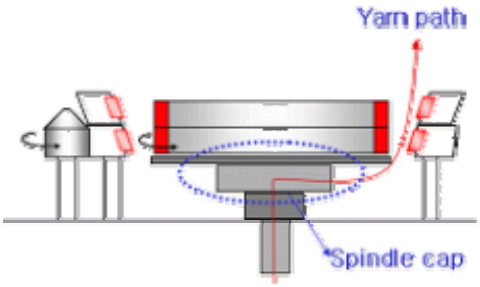

Figure 2. Spindle revolution system which is consists of spindle cap and the magnetic-levitation spindle.

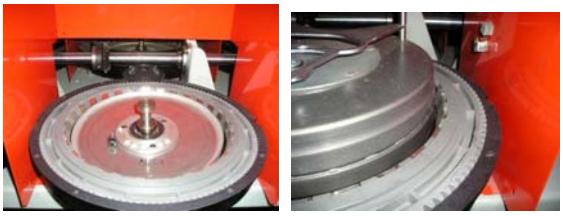

Figure 3. Shapes of the magnet in the power delivery part.

Driving Condition of the Magnetic-Levitation Spindle: The magnetic-levitation spindle is rotated by the optimum yarn speed of 15-20 m/min and the optimum spindle rotation of 5,000-5,500 revolution per minute. This spindle system inserts the twists easily because there is not limit to the yarn type of cotton and linen.

3. RESULTS AND DISCUSSION

Newly developed magnetic-levitation spindle has maximum yarn speed of 35 m/min and maximum spindle revolution of 6,500 rpm.

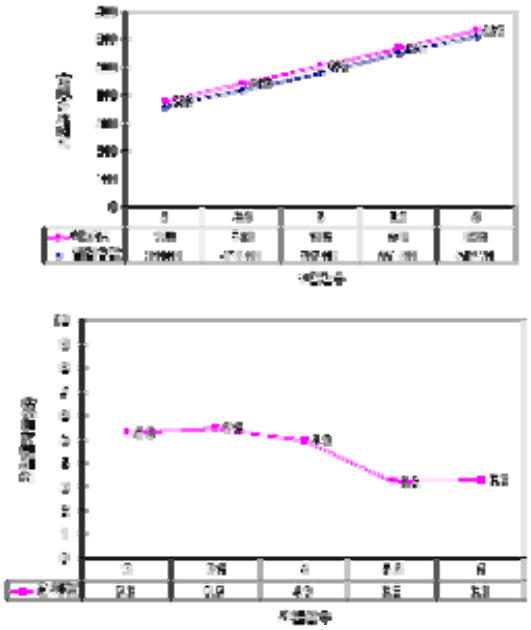

Figure 4. Total number of twists (upper) and twist deviation (lower) in the linear density of Ne 20 cotton yarn.

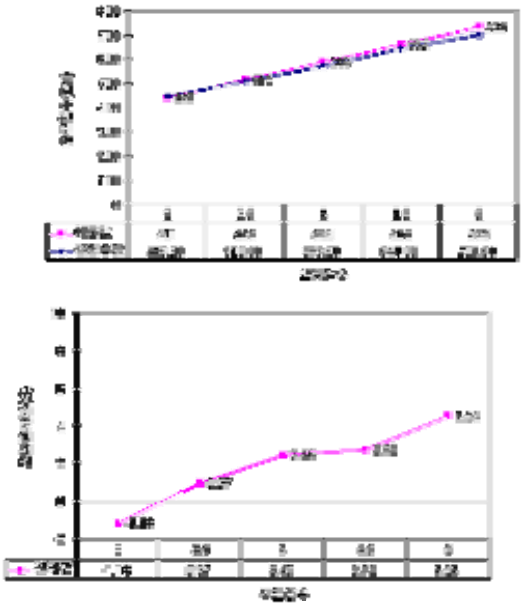

Figure 5. Total number of twists (upper) and twist deviation (lower) in the linear density of Ne 40 cotton yarn.

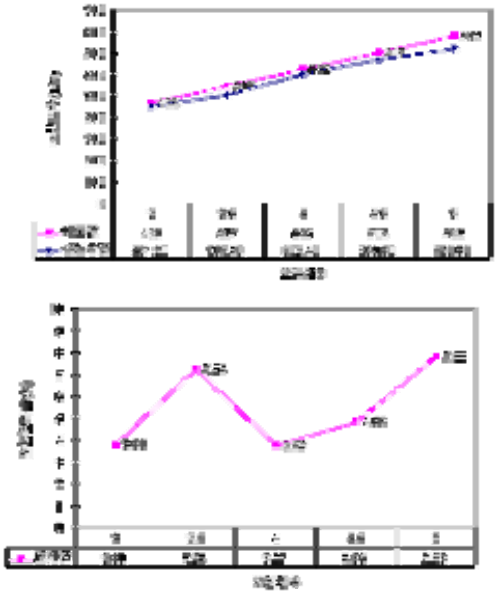

Figure 6. Total number of twists (left) and twist deviation (right) in the linear density of Ne 60 cotton yarn.

The above Figures 4-6 show the total number of twists and twist deviation in the cotton yarn of the linear density of Ne 20, 40, and 60.

4. CONCLUSIONS

To reduce the pirn winding and interlacing for yarn texturing, the magnetic-levitation spindle twisting technique is required to simplify the yarn twisting process for the different physical property yarns. Twisting characteristics are changed according to the changes of linear density of cotton yarns in magnetic levitation spindle twisting.

5. REFERENCES

[1] Application of Textile New Technology and Its Analysis, Choon Gil Lee and Kyoung Tai Son, Kyungil University Press, 2008

[2] Elementary Fluid Mechanics, J. H. Vennard, John Wiley & Sons, Inc.

[3] Transport Phenomena, R. Byron, John Wiley & Sons, Inc.

[4] The Dyeing of Textile Materials, J. Cegarra et al.

[5] A. B. Marmarali, *Text. Res. J.*, 73(1), 11 (2003)