

Analysis and Enhancement of Carding and Spinning

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Currently, the process for staple yarn manufacturing involves about ten individual steps. Earlier (NTC project F98-G15), we developed a technology that shortens the processing sequence to two major steps: opening/cleaning, and yarn formation (card-spinning) which consists of a card fitted with a web dividing device and multiple spinning nozzles (See Schematic). We have demonstrated the feasibility of the key individual sub-systems, and have now successfully integrated the fiber opener, card, web divider, yarn spinning head and winder into one continuous system. Our web dividing mechanism is designed using airjet nozzles. For a demonstration test run video of yarn spinning directly from carded web without intermediate steps, visit our project website at <http://www.tfe.gatech.edu/faculty/wang/NTCF01G06>.

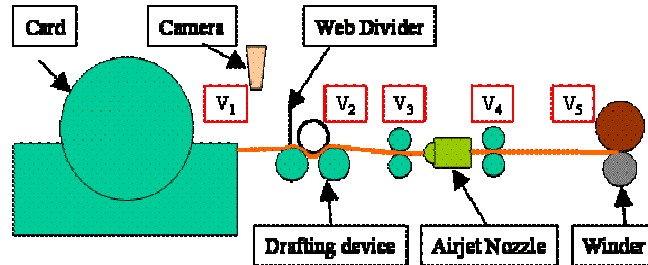
We have also conducted an analysis on the effect of processing conditions on the properties and operational characteristics of yarns produced on the Card-Spinning system. We are also exploring ways to improve card web uniformity, including analyzing the transfer function of the card and introducing fiber mobility in the machine transverse direction. We are implementing a real-time on-line card web uniformity monitoring system to measure the web uniformity, not only in the machine direction, but also in the cross direction (See Figure and Photo below). This in-

Data Analysis System of Card Web Image

Card Web Image from Line Scan Camera

We are developing the knowledge base that can lead to better carding and spinning processes, and fewer steps to convert fiber into yarn.

formation is essential in carding enhancement studies and in obtaining uniform web suitable for direct spinning after dividing.



Card-Spinning Unit: the carded web is divided into multiple ribbons that are then fed to spinning nozzles.

home furnishing. We are now optimizing our Card-Spinning system to improve efficiency and yarn quality.

Yarns produced from the Card-Spinning system to date ranged from 102 to 188 tex in linear density (See Photos below). Under certain conditions, the yarns show an appearance of a fancy yarn. The yarns may be suitable for many applications such as secondary carpet backing fabric, industrial textiles and



Yarns Produced from the Card-Spinning System

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Industry Interactions: 10

Project Web Address:

<http://www.tfe.gatech.edu/faculty/wang/NTCF01G06>

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F02-C02*, F92-S12, M94-S02, F94-A08, F94-S09, F95-C09, F97-C05*, F98-C04, F98-G15, F01-CL04*, F01-GT06, M03-CL07

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