Cluster-Spun Yarn – A New Concept in Composite Yarn Spinning

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Abstract The aim of this work is to explore a new method for producing spun yarn on a modified ring spinning system which is called "cluster-spun yarn". Here, we describe the effects of the clustering of polyester multifilaments on the internal structure and properties of a composite yarn. Cotton fibers and polyester multifilaments were spun into 19 Ne cluster and core-spun yarns at five different twist levels. These yarns were then tested to compare their properties, including tenacity, elongation, and evenness. Surface morphology and structural variations of cluster and core-spun yarns were studied by scanning electron microscopy. Microtome and image-processing methods have been used to study the structure and packing of fibers in the cross-section of yarns. The results show that the special structure of a cluster-spun yarn results in pronounced enhancement in the structural mechanics and yarn properties. The statistical analysis results indicate that the tenacity and breaking elongation of cluster-spun yarn is significantly more than that in core-spun yarn. The results show that the twist factor at about 3.9(α_e) gives the optimum properties. In addition, lower twist is needed to produce quality yarn in cluster-spun yarns as compared with normal core-spun yarns.

Key words cluster-spun yarn, core-spun yarn, composite yarn, clustering, solo spun, spread width, internal structure, structural mechanics, fiber, yarn, fabric formation, spinning, quality, structure-properties, properties, strength

Composite yarn spinning techniques have been under focus for further developments in recent years. In composite yarns a continuous filaments yarn is combined with staple fibers to form a unique structure. Composite yarns can be produced by various spinning methods, such as ring, friction, air jet, and rotor spinning, among which the modified ring spinning method is the conventional one [1, 2]. Core-spun yarn production on the conventional ring spinning frame consists of two components, namely filament and staple fibers. The former forms the center axis or core

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