ABSTRACT

Manufacture of sheath-core yarn from synthetic filament and cotton is one of the most important developments in the field of textile Industry. Use of sheath-core yarn is mainly aimed to improve the physical properties such as strength, comfort, durability, aesthetic and other functional properties of the final yarn. The thesis reports the results of investigations carried out on sheath-core spun yarns made from polyester/nylon filament as core and cotton as sheath material manufactured both on air-jet and ring spinning systems. Three different types of nylon/polyester crimped/drawn filaments, namely 30, 44 and 70 denier were used to prepare different sheath-core yarns of the proportions 85/15, 75/25, 60/40 respectively on both air-jet and ring spinning systems separately. Total twenty four different sheath-core yarns were made on the two spinning systems (Twelve on air-jet and Twelve on ring frame) and the yarn properties were compared with 100% cotton ring spun yarn. It was observed that sheath-core yarns were having some improved physical properties over that of 100% cotton ring-spun yarn in many respects like yarn strength, elongation, energy to break and on yarn imperfections. Air-jet sheath-core yarns exhibited lower yarn strength as compared to 100% cotton yarn but the same yarn excelled in other properties like evenness and total imperfections than 100% cotton yarn. The core yarns contained up to 25% filaments at the core were covered 100% by sheath cotton fibres when examined under SEM.

With the entire above mentioned core yarns plain fabrics were prepared on Sulzer loom. Total twenty four different sheath-core yarn fabrics were prepared. The properties were compared with 100% cotton ring-yarn fabric. Physical properties of all fabrics were tested. It was observed that sheath-core yarn fabrics were having improved physical properties over that of 100% cotton ring-spun yarn fabric in many respects like strength, elongation, tearing strength, abrasion resistance, air permeability, water absorbency and crease recovery in both the spinning systems.
Low stress mechanical properties of apparel fabrics prepared from different sheath-core yarns were compared. Fabrics were tested on Kawabata instrument and the results were compared with 100% cotton ring-spun yarn fabrics. It was observed that the fabric stiffness was increased with the increase in synthetic filament % at the core of sheath-core yarn, irrespective of the spinning process. Total hand value was also increased when the filament percentage was increased at the core. Air-jet sheath core yarn fabrics showed higher total hand value than that of the ring sheath-core yarn fabrics. Statistical tests were conducted to establish correlation between yarn properties and that of fabric properties.