Processing and Properties Of Open End Spun Cotton Polypropylene Blended Yarn

Hassan M.BEHERY
School of Textiles, Clemson University,
South Carolina

Polypropylene (PP) fiber is considered to be the cheapest synthetic fiber. It posseses some precious characteristics, such as high strength and light weight, high abrasion resistance and high covering power. However, polypropylene fiber does not absorb water, which limits its apparel application. Cotton fiber absorbs water but its crease and abrasion resistance are not as high as that of PP fiber. A polypropylene and cotton blended yarn for apparel application is investigated which may possess the characteristics of both kinds of fiber.

The open-end spinning technology of a polypropylene/-cotton blended yarn has been studied in this investigation. The main objective of this study is to investigate the three main facxtors: rotor speed, rotor diameter, and twist multiplier of open-end spinning, as well as their effects on yarn qualities and the running condition of the open-end spinning process.

The response variables for yarn qualities are break factor, CV % for yarn evenness, thin places, thick places and nep count. The response variable for running condition is end-breakage.

The experimental results indicated that there is a possibility of producing polypropylene/cotton blended yarn at a high production rate with low cost by open-end spinning.

1.INTRODUCTION

Polypropylene (PP) has become commercially available in the 1950's. It has the potential to be the cheapest and widespread synhetic fiber and possesses some unique characteristichs.

Polyproylene fiber is characterized by its high strength strength and ight weight. It has very good covering power due to its low specific gravity and good the mal insulation. The crease resistance of PP fiber is of the same order as wool.

The main application of the PP fiber is in home furnishing and upholstery; such as carpet fibers, and industrial fabrics; such as geotextiles and filter fabrics. The range of application in apparel has been limited due to fiber being hydrophobic.

A blended yarn of PP and cotton fiber can combine the characteristics of both kinds of fiber. It will possess the water-absorbency of cotton and the good covering power, crease and abrasion resistance of PP fiber. It also can have the advantage of the low price of PP fiber.

The effects of rotor speed and diameter as well as the yarn twist have been studied extensively by many researchers. Stalder, found out that increase of rotor speed had significant effect on reduction of production of cost [Stalder, 1979]. The increase of rotor speed had also resulted in a reduction of yarn quality. Wolfhorst, also reported that rotor speed and yarn twist had a radical effect on production cost [Wolfhorst, 1979].

Tower, 1979 found that different kinds of machine design gave different yarn qualities and reacted differently to the increase of rotor speed [Towery, 1979]. But, in general, there was a trend of decreasing yarn quality as rotor speed increased.

Schonung, calculated the optimal rotor speed in relationship to rotor diameter for maximum yarn strength [Schonung, 1980]. He found that when rotor diameter increased, the optimal rotor speed for yarn strength decreased.

Simpson et al [Simpson, 1979] attributed the lower quality of yarn with higher rotor speed to the deterioration of fiber orientation in the yarn.

The work carried out at the Textile Research Center at Texas Tech Univerty [Textile Topics, 1982,] for studying the influence of rotor speed and diameter on yarn properties indicated that the properties of the yarn spun deteriorated when either rotor speed or rotor diameter was increased. The work was carried out on four yarn counts using three different fibers of 100% cotton, a 50/50 blend of cotton and polyester and a 100% polyester. Three rotor spinning machines were used in this study. It was also observed from their results that for a given yarn number, the relationship between yarn property and rotor speed were different, but approximately parallel, for each size of rotor.