EFFECTS OF FIBRE CHARACTERISTICS AND BLEND RATIOS ON THE TORSIONAL BEHAVIOR OF WOOL/POLYESTER BLEND YARNS

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The torsional rigidity of single spun blend yarns was estimated in terms of physical and mechanical characteristics of its constituent fibres such as fibre diameter, and its distribution parameter, fibre ellipticity, mean fibre length, and torsional and bending rigidity of constituent fibres and yarn structural parameters such as surface helix angle, yarn linear density and blend ratio by weight fraction of blend yarns.
Estimated values were applied to various wool/polyester blend yarns which made with differing blend ratios, and then compared and discussed with experimental results. And it was shown how the yarn twist and blend ratios in the single spun blend yarns affect the torsional hysteresis behavior, and the contributions of interfibre friction by calculating energy loss and coercive couple in torque-torsion hysteresis curve were discussed.
The conclusions are as follows.
Specific torsional rigidity of a single spun blend yarn was linearly increased with increasing yarn tension and extrapolating specific torsional rigidity was adopted by specific net yarn torsional rigidity. The effects of blend ratios to the net specific torsional rigidity of the single spun blend yarn was exactly shown in the region from 30 ° to 35 ° of yarn surface helix angle. And the specific net yarn torsional rigidity was decreased with increasing blend ratio of polyester fibre.
The specific net torsional rigidity of single spun blend yarn depends upon yarn twist, the ratios of the torsional rigidity to the bending rigidity of constituent fibres, and blend ratios. The maximum specific net torsional rigidity of blend yarn was obtained with increasing yarn surface helix angle the same as tensile modulus, E, and bending rigidity, EI.
Torsional hysteresis energy due to interfibre friction of constituent fibres and coercive couple due to initial resistance of constituent fibres to the torsional deformations were also increased with increasing yarn tension. The effects of blend ratios to the hysteresis energy was more evident than that of torsional rigidity and coercive couple.

These were also decreased with increasing blend ratio of polyester fibre the same as that of yarn torsional rigidity. And maximum hysteresis energy loss was shown to the yarn surface helix angle, but not in the coercive torque.