CHAPTER - IV

GENERAL SUMMARY
Prior to the detailed studies of the various quality aspects of acrylic-viscose rotor spun yarns, certain investigations were carried out on rotor spun viscose rayon yarns made of different fibre lengths so as to select the proper and practical fibre length. It seems that rotor yarns spun from relatively shorter fibres are stronger. The breaking extension decreases and the twist loss in rotor yarns increases with an increase in fibre length. Whereas in ring yarns, unevenness and thick places show an improvement with increase in fibre length, there is a distinct deterioration in these yarn parameters in rotor yarns.

Based on the above observations, fibre and process parameters were chosen for spinning a range of acrylic-viscose yarns of varying fibre compositions and twist levels on rotor spinning frame. It is seen that yarns spun from a higher proportion of viscose-fibres possess a marginally higher strength. Breaking extension increases with increase in twist factor and is higher for yarns spun with a majority of acrylic fibres. Yarns spun with higher proportions of acrylic fibres are more regular; however, an increase in twist makes them uneven. The twist loss increases with increasing twist factor and is higher for yarns with higher viscose content. Further, the flexural rigidity is slightly lower in acrylic-majority yarns than in viscose-majority yarns and shows an increase with increasing twist. In blended yarn, the location of stiffer fibre appears to
decide its flexural rigidity. The blended yarn with the stiffer fibres in the sheath shows a slight decrease in flexural rigidity with an increase in twist. On the other hand, the elastic recovery of all viscose fibre yarn is lower because of the poor elastic recovery of the fibre. Change in yarn twist does not cause any significant change in the elastic recovery.

The yarn tenacity is observed to be maximum at an extension rate of 200 mm/min for 100 mm test length and drops gradually as the extension rate is increased to 1000 mm/min. However, the 500 mm test length shows a steady increase upto 500 mm/min and registers a very little increase at 1000 mm/min extension rate. Yarn strength slightly decreases as test length increases from 100 mm to 500 mm for extension rates in the range of 50 to 500 mm/min. However, at 1000 mm/min extension rate the tenacity is higher for longer test length. The breaking extension, being lower for longer test length, increases with increasing extension rate particularly with shorter test length (100 mm). On the other hand, the increment appears to be marginal for 500 mm test length.

It follows from these studies that repeated extension of acrylic-viscose yarns causes a decrease in tenacity and breaking extension; the reduction being of lower magnitude in acrylic-majority than viscose-majority yarn. The
decrease in both of them seems to be lower in low-twist
yarns and increases with an increase in amplitude of
extension or number of cycles.

The transient response of these yarns to steam-
relaxation treatment has also been investigated. It is
observed that steam-relaxation treatment results in a loss
in breaking strength of acrylic-viscose rotor yarns, the
reduction being of lower magnitude in 100% viscose and high-
twist yarns. Yarns except 100% viscose, exhibit higher
breaking extension after steaming treatment irrespective of
twist. Yarn diameter and bulk decrease with increase in
twist factor but increase after steam-relaxation treatment.
Acrylic-majority yarns exhibit higher residual shrinkage,
the latter increases with increasing twist factor for 50%
acrylic-50% viscose yarns.

Acrylic-viscose rotor yarns work quite satisfactorily
in knitting. It is seen that fibre composition has no
effect on fabric weight in dry-relaxed state. The fabric
weight decreases initially and increases thereafter with an
increase either in yarn twist or tightness factor for both
dry- and fully-relaxed fabrics. In fully-relaxed state,
slack knits exhibit lower areal shrinkage. However, an
increase in yarn twist results in a decrease in shrinkage
followed by an increase with further increase in twist.
Fabric thickness increases with increasing acrylic content
and yarn twist and is generally higher for fully-relaxed
fabrics. However, fabric thickness reflects the same trend
as fabric weight vis-a-vis tightness factor irrespective of the relaxation treatment. Dry-relaxed knits from higher proportions of acrylic fibre yarns exhibit more pilling tendency, the latter considerably reducing with an increase in twist and tightness factor after full-relaxation treatment.