Today every industry is concerned with the cutting edge technology for improving its performance. Although microfibres are used by the textile industry for the production of niche products, there is complete absence of work on the characteristics of yarns produced by different spinning technologies and the precautions to be taken during processing of these fibres.

This thesis deals with the mechanical processing of various types of microfibres in semi high production and high production cards, for optimization of process parameters. Micro modal, lyocell, polyester and its blends with cotton were processed in cards and studied for their performance in terms of fibre breakage, neps, short fibre content, sliver cohesion and orientation index. Spinning of micromodal and lyocell fibres was done on conventional ring and compact spinning systems for the study of tensile properties, hairiness, evenness, friction, abrasion, wicking and handle properties such as bending and compression at three twist levels. Fibre migration study by the use of tracer fibre technique was carried out on ring and rotor spun yarn. Micro and normal denier single jersey weft knitted fabrics were produced using viscose and polyester fibres in circular knitting machines for comparison of fabric properties such as dimensional stability, spirality, bursting strength, wicking, drape etc. Scanning electron microscope was used to evaluate the surface properties. The surface mechanical property measurements of single jersey, microdenier and normal denier fabrics were
carried out using the Instron tensile tester over a range of normal loads. A novel friction parameter “R” was developed to characterize the surface mechanical properties. Bilayered socks were knitted using microfibres and compared with regular socks for the comfort properties. Study on low stress mechanical properties of micromodal and 50/50 micromodal-cotton blend was done using Kawabata evaluation system for the study of fabric hand.

It was found that carding parameters such as delivery hank, flat speed and doffer speed had a profound influence on fibre breakage, short fibre content and neps in card sliver. Mean length of fibre followed different types of distribution when statistical analyses were carried out on the data. It was found that compact yarns produced from modal and lyocell microfibres exhibited higher tenacity, higher elongation, lower variability of tenacity, elongation and lower hairiness in comparison with regular yarns. Fibre migration was found to be lower in rotor spun microdenier yarns compared to ring spun yarns. Packing factor was found to be higher for compact yarns and increased with increase in twist factor. There was no difference in the yarn friction of compact and regular yarns.

It was found that weft knitted fabrics made out of microdenier polyester and viscose yarns displayed better drape, lower spirality, higher bursting strength, higher wickability, higher absorption and smooth surface. The composite friction factor ‘R’ which represents a new index was lower for microdenier knitted fabrics. Bilayered fabrics produced from micro fibres were found to have better comfort characteristics. The development of
microdenier fabrics has clearly opened up new avenues of research in the field of textiles.

Thus it was found that the microdenier fabrics were found to excel regular yarn fabrics in a number of areas and its use is recommended.

The industrial implications of the study have been fully discussed.