ABSTRACT

This study is initially concerned with the measurement of low stress deformation and recovery properties of silk Crepe-de-chine fabrics in tensile, shear, pure bending and lateral compression modes. The KESF (Kawabata Evaluation System for Fabrics) has been found to be very useful in the routine measurement of these properties.

A series of Crepe-de-chine fabrics constructed from yarns differing in twist has been tested for low stress mechanical properties using the expert system. It is possible to discriminate them by the discriminant analysis. It has been possible to optimise the twist level for obtaining a fabric with a good crepe effect and handle in both the groups on the basis of the results obtained. In addition eight groups of commercial fabrics have also been considered for objective evaluation by KESF, and the results are presented.

The relationship between twist and yarn bending rigidity has been examined, and it has been found that an increase in twist has led to a drop in flexural rigidity.

The development of a new fabric extraction tester is described, and the results obtained on the silk fabrics are discussed. Relationships have been established between the fabric extraction force and the low stress mechanical properties which show that this method offers distinct advantages over the other systems.
The relationship between the mechanical properties obtained by simpler system and the KESF (Kawabata Evaluation System for Fabrics) has been found to be very good. The correlation between surface layer thickness (SLT) and total hand value (THV) of a series of Crepe-de-Chine as well as commercially produced silk fabrics has been found to be good. Besides handle of fabrics, the tailorability of the fabrics has been evaluated.

The relationship between the predicted bending rigidity and the experimental values has been found to be good. An analysis of the handle force and prediction of it with different nozzle diameters is presented. Measurements of thermal properties, namely, thermal conductivity and $q_{max}$ have been made with a view to studying the comfort properties. It is found that increase in the amount of twist in the weft yarn has led to an increase in $q_{max}$, hence implying that warm feeling has been improved. A study of thermal properties of the various silk fabrics has been reported.

Based on the results, polar charts have been prepared for deciding the acceptability of the silk fabrics; these will help comparing the various fabrics and also in the process control. These could be used in a garment industry where the mass scale production of the garments needs specific mechanical properties to give the improved efficiency in production.

Also, the simple instrument developed can be used as a routine quality control tool in a garment unit for assessing variation in the handle of incoming fabric lots, and to know the subtle differences noticed in the finishes imparted to them. The implications of the study have been fully discussed.