TRANSMISSION CHARACTERISTICS OF LAYERED WEFT KNIT FABRICS FOR SPORTSWEAR

A THESIS

Submitted by

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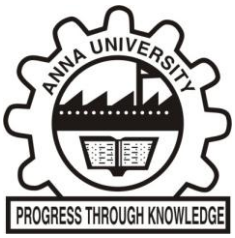

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ABSTRACT

The knitted fabric is highly suitable for next to the skin wear, while under low loading conditions it acquires high extensibility which allows it to fit snugly and without discomfort on any form on which it is pulled. The unique characteristic of knitted fabric is suitable to meet the requirements of the sports clothing. So, many researchers are doing research in designing of active clothing using single and/or layered knitted fabrics. The double and multi layered knit fabrics are used in sports for their transmission characteristics such as water vapour permeability, air permeability, thermal conductivity and one way liquid transport capacity. The above characteristics of the layered fabrics are continuously enhanced using science and technological advancements during the manufacturing process. An attempt has been taken in this research work to improve the transmission characteristics of layered knit fabrics.

The transmission characteristics of the layered knit fabric were first studied by producing the fabric with two different principles i.e. tuck and loop connection principles. For this, three levels of tuck connected double layer knit fabrics have been produced and studied their transmission characteristics. The fabric with the better transmission characteristics was compared with loop connected knitted fabric for understanding the transmission characteristics of tuck and loop knitted fabrics. The compared result proved that the loop connected fabrics possess improved transmission characteristics.

Furthermore to study the impact of cotton and polyester material in the back layer of the double layer knit fabric, fabrics were produced with 16.87 tex cotton and 150 denier polyester in the back layer of the fabric. Transmission characteristics of these fabrics were studied and the fabric with cotton in the back layer showed better transmission characteristics when compared with polyester as back layer.

Further the study was carried out using double layer fabric produced with loop connection principle and cotton is the back layer. To study the effect of number of yarn feed on the transmission characteristics of double layer knit fabrics, samples were made with single, two, four and six feeds of yarns, maintaining similar linear density for all the samples. The results proved that the fabric produced with single feed gives good transmission characteristics.

In order to study the influence of fabric structure on the transmission characteristics of the double layer knit fabric, fabrics with different structures were produced by changing the loop/stitch formation of the connecting thread between face and back layer of the fabric. The double layer knit fabric produced with knit loop in the connecting thread showed better transmission characteristics due to presence of polyester fiber in the face layer of fabric which facilitated transmission.

An attempt had also been done, by developing multi layered knit fabric with loop transfer technique using computerized multi gauge flat knitting machine. Cotton yarns were used in all the layers of the fabric as it

was found practically difficult to process polyester in the middle layer of the fabric. The developed multi layer knit fabric was compared with double layer knit fabric. The transmission characteristics of multi layer knit fabric found to be superior to the double layer knit fabric due to presence of air gap between the layers of multi layer fabric.

The double layered weft knit fabric having the optimum transmission characteristics was selected for the development of sports protective product. The batting glove was developed for the cricket sports and the subjective evaluation between the double layered fabric glove and market glove was carried out by the field experts. Based on the various judgment criteria, ranking and statistical analysis it was proved that the batting glove made from double layered knit fabric exhibited good performance when compared with the glove which is commercially available. Hence the usage of double layer knit fabrics in the manufacture of protective sports glove is highly preferred.