

Comparison between Physical Properties of Handloom Denim and Powerloom Denim

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ABSTRACT

Denim is the most preferred clothing of today's youth. Denim manufacturing is the most water, energy and chemical intensive process. Chemicals which are used are hazardous for health. To minimize these consumption values, leading denim manufacturers have begun to employ sustainable production models. Handloom denim and khadi denim is one such initiative in which sustainable method of production is being used. Handloom denim is different from powerloom denim in terms of processing, technique, product and cost. There can also be differences in physical properties amongst denim made on handloom and powerloom. Hence this study is aimed at understanding the differences in physical properties of handloom and powerloom denim fabric.

Key Words : Handloom denim, Powerloom denim, Physical properties

INTRODUCTION

Denim though considered being one of the oldest fabrics in the world yet remains fresh even today. Ever since its inception it has been conventionally produced from 100% cotton. Since denim is the unique apparel preferred by all age groups and due to its popularity, a lot of development work has been done in the last few decades. Due to these innovations, a large number of variants of denim are available to the customer today. The expectations from fabrics have changed with developments in textile technology and the consumers' living standards. Modern consumers are interested in clothing that not only looks good but also feels great. The warp yarn is traditionally dyed with the blue pigment obtained from indigo dye. Indigo was the most significant natural dye known to mankind until the introduction of synthetic dyes, at the end of the 19th century.

Eco-friendly sustainable garment design is the new challenge for garment designers and producers, because the consumers are concerned in eco-fashion in the last decade. In the fast-changing fashion trends, all are now

motivated to practice sustainability in design and production processes. Handloom denim is one such innovative and sustainable method of denim production. Handloom Denim is woven out of mill-spun yarn, on manually operated wooden frame, floor mounted, foot-pedal handlooms, in weights ranging from 5 oz to 13 oz. The entire process of making hand-woven khadi denim fabric is hand-based and is carried out without using electricity, or burning any other fuel. So, the objective of present study is to compare physical properties of handloom and powerloom denim fabric.

METHODOLOGY

Two denim fabrics in medium weight range which is between 8 ounces to 12 ounces were selected for the present study. One variant of powerloom denim fabric one is 100% cotton fabric was procured and another handloom denim.

Fabric specifications are given in table 1. Since only characteristics and physical properties of denim fabrics have been studied so no use of chemical has been made.

Table 1 : Specifications of denim fabric

Sr. No.	Fabrics	Weight (ounce)	Color
1.	100% Cotton Powerloom denim	10.75	Blue
2.	Handloom denim	11.44	Blue

Fabric testing of handloom and power loom denim had been done. Tests had been conducted to check the differences between the physical properties of both standardized test procedures have been to check the physical properties of denim fabric.

RESULTS AND DISCUSSION

Characteristics:

Count of yarn:

The test method used is IS: 3442:1980, apparatus used was Beesley balance. This standard prescribes a method for determination of crimp and count of yarn removed from any textile fabric in which yarns are intact and can be removed in measurable lengths.

Table 2 : Determination of count of yarn (Ne)

Sr. No.	Fabrics	Warp wise (Ne)	Weft wise (Ne)
1.	100 % cotton powerloom denim	10	9
2.	Handloom denim	6	7

It was observed that yarn count was highest in case of 100% cotton power loom which indicates finer yarn used in case of handloom denim is lowest which indicates thicker yarn was used for denim fabric.

Thread count:

Test method used was IS 1963:2004. Ends and picks of all the variants of denim were measured. It was observed that 100% cotton power loom denim has highest thread count and handloom denim with natural indigo has lower thread count amongst all the fabrics.

Table 3 : Determination of thread count

Sr. No.	Fabrics	Ends (Inch)	Picks (Inch)
1.	100 % cotton powerloom denim	109.	65
2.	Handloom denim	78	34

GSM:

GSM means grams per square meter of a knit, woven or non-woven fabric. The test method used is IS:

1964:2001, GSM cutter and digital balance was used for this test.

Table 4: Determination of GSM

Sr. No.	Fabrics	GSM
1.	100 % cotton powerloom denim	362.2
2.	Handloom denim	349.4

Powerloom denim and handloom denim both has higher GSM which means it is less stiff and offers a better drape.

Tensile strength

Test method used as IS: 1969:2009. This test method is used for determination of tensile strength and elongation at break of woven fabrics (natural or man-made fibers or blends).

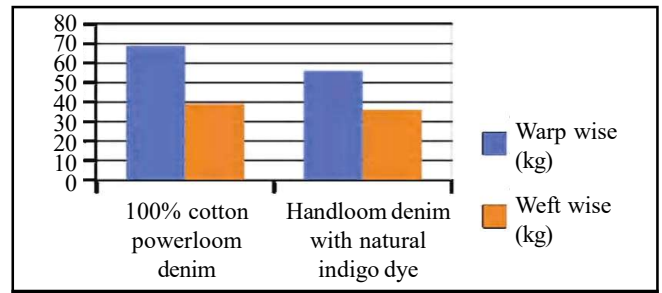


Fig. 1 : Tensile strength (kg) of denim fabrics

It was observed that tensile strength was highest amongst 100 % cotton power loom denim and lowest in handloom denim.

Stiffness test:

This measures the length of the fabric that will bend under its own weight to a definite extent to make a definite angle of deflection. It is measured by the Shirley stiffness tester. The test method employed for this is IS 6490:1971.

Table 5 : Bending Length (cm) of denim fabrics

Sr. No.	Fabrics	Front Warp (cm)	Back Warp (cm)	Front Weft (cm)	Back Weft (cm)
1.	100 % cotton powerloom denim	4.8	4.84	2.48	2.56
2.	Handloom denim	2.82	2.96	2.16	2.06

Bending length was done to determine the stiffness of fabric samples. The bending length was high since denim fabric is stiff and medium weight. Bending length

was found to be highest amongst cotton powerloom denim and lowest in case of handloom denim natural indigo. This was probably due to presence of dye and high amount of size in case of powerloom fabric.

Crease recovery:

Creasing angle is the angle between the two limbs of a specimen after creasing under controlled conditions. It is a measure of the resistance of the fabrics to creasing and may be used to compare fabrics and finishes in this respect. Test method IS 4681:1981 was specified load for a specimen time. Crease recovery angle of all the denim variants were found to be high. Handloom denim has shown very good crease recovery and less crease recovery in case of cotton polyester powerloom denim was observed.

Table 6 : Determination of crease recovery

Sr. No.	Fabrics	Warp (Degree)	Weft (Degree)
1.	100 % cotton powerloom denim	145.5	143.3
2.	Handloom denim	169.5	163

Cusick drape:

The test method used was IS 8357:1977. It describes the way a fabric hangs under its own weight determines how good a garment looks in use. It differs from fabric to fabric and depends on end usage. The drape coefficient is calculated at the ratio of the projected area of the drape specimen to its theoretical maximum.

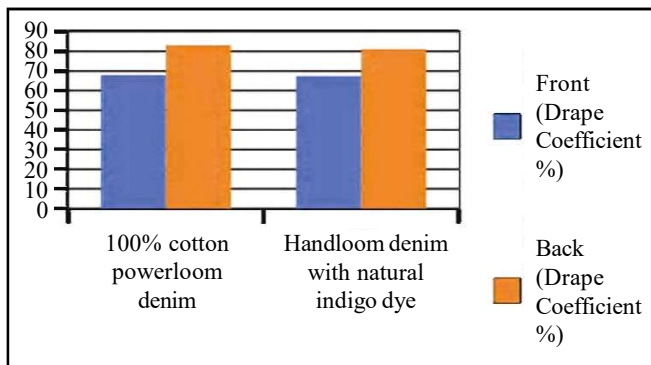


Fig. 2 : Cusick drape coefficient of denim fabrics

Cotton polyester denim has high drape coefficient amongst all other variants of denim. Handloom denim has the least drape which means it is less stiff and offers better fall.

Weave:

ISO 3572:1976 test was used for weave. Denims are known for its 3 x 1 weave structure and right-hand twill weave (RHT). Denims which are heavier weight over 5 oz/ square yards are woven in 3 x 1 weave which is a characteristic of denim fabric.

Table 7 : Determination of weave of denim fabrics

Sr. No.	Fabrics	Weave	
1.	100 % cotton powerloom denim	3 X 1	LHT
2.	Handloom denim	3 X 1	RHT

It was found that all the denim fabric has right hand twill except cotton power loom denim which is left hand twill.

Colorfastness to Crocking/ rubbing:

IS: 766:1988 test method was used. Specimens of the textile are fastened to the crock meter and rubbed against white cloth.

Table 8 : Fastness to crocking of denim fabrics

Sr. No.	Fabrics	Dry	Wet
1.	100 % cotton powerloom denim	4-5	3
2.	Handloom denim with natural indigo dye	4-5	4

All the denim fabrics shown good dry fastness as compared to wet fastness. Handloom denim offered better fastness than powerloom denim

Wash fastness:

Test method IS/ISO 105-C10: 2006 was used. A specimen of the textile in contact with specified adjacent fabric or fabrics is laundered and dried. Specimens are laundered under appropriate conditions of temperature, alkalinity, bleaching and abrasive action such that the result is obtained in a conveniently short time.

Table 9: Wash fastness of denim fabrics

Sr. No.	Fabrics	Color change	Staining on wool	Staining on cotton
1.	100 % cotton powerloom denim	4	4/5	4/5
2.	Handloom denim	4/5	4/5	4/5

It was found that all the variants of denim offered good wash fastness both in case of wool and cotton.

Also, it was observed that there was no significant color change.

Conclusion:

It was concluded from the study that handloom denim has comparable properties to powerloom denim. It showed good wash fastness, fastness to crocking, abrasion resistance and crease recovery whereas it was found that it showed less tensile strength, yarn count and thread count as compared to powerloom denim since the handloom denim is woven on handloom.

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