

EFFECT OF WEAVE DESIGN ON MECHANICAL PROPERTIES OF FABRIC



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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

ABSTRACT

The concept of weaving has been the part of human life since its very inception. With the passage of time, as every technology prospered, weaving also entered into a new era. Previously only simple form of weaving was employed for end uses but with the introduction of various shedding and picking systems, the choice of varieties increased and the concept of design emerged.

The introduction of design to the weaving took this technology to new heights. With different designs, concept of change in physical properties of the fabric was also evident. The research work carried out was basically focused on the analysis of different weave designs, its production and its ultimate effect on mechanical and physical properties. Different weaves behave differently when we talk about its appearance, draping quality and strength.

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*If oceans turn into ink and all the wood become pens, even then, the praises of **ALMIGHTY ALLAH** cannot be expressed. I set my unfeigned and meek thanks before **HIM**, Who created the universe and bestowed the mankind with knowledge and wisdom to search for its secret, favored and invigorated me with the fortitude and capability to aptly complete my research work, and contribute a drop to the existing ocean of scientific knowledge.*

*Trembling lips and wet eyes praise for Prophet **HAZRAT MUHAMMAD** (peace be upon him), who is forever a torch of guidance for the entire humanity.*

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Chapter 1

INTRODUCTION

1.1 Textile Design

Textile design is the process of creating designs for knitted, woven or printed fabrics. Designs for both woven and printed textiles often begin with a drawing or watercolor sketch of the finished design. Traditionally, drawings of woven textile patterns were translated onto special forms of graph paper called *point papers* which were used by the weavers in setting up their looms (Collier, Bide & Tortora, 2009).

1.2 What is Design?

Design is the process of constructing a description of a product that satisfies a functional specification or esthetic effect, meets certain performance criteria and resources limitations, realizable in an available technology and satisfies criteria such as simplicity, testability, manufacturability, reusability etc. In weaving design is the manner used to represent the series of interlacement of the threads (Matsuo & Suresh, 1997).

1.3 Ways of Creating Design in Textiles

Textile design is of two kinds, namely (i) structural, and (ii) decorative. The first relates to the specific manner in which warp and weft threads are interlaced, by which evolved woven design which constitutes the technique of fabric structure. The second relates to the scheme of ornamentation by which a textile fabric is decorated, which is also more or less dependent upon woven design. (Nisbet, 1906)

The process of inducing a design into the fabric makes a simple structure of fabric more aesthetically appealing. Design can be induced into the fabric in a number of ways:

- During production (Weave Design)
- During printing (Print design)
- On the Fabric Surface (Embroidery)

1.4 Method of Fabric Representation

1.1. 1.4.1 Thread Diagram

The unit of woven fabric is the point of intersection of a warp end and a weft pick, the interlacing being of two possible kinds as shown in Figure 1.3. In either case the interlacing is achieved by the manipulation of the ends, these being raised or lowered to produce the interlacing. A number of these, interlacing combined together in both directions produce a unit of design and one repeat of the weave. The simplest weave which can constitute a cloth requires two ends and two picks as a repeat of design, is known as the plain weave, and can be pictured as in Figure 1.4.



Figure 1: Thread Diagram

As the diagram represents a complete unit of design it must be understood that successive neighboring units will be identical with the first as shown in Figure 1.4. In this diagram four repeats of the construction are shown but normally one unit is quite sufficient to predict the entire interlacing pattern of a cloth (Grosicki, 1975).

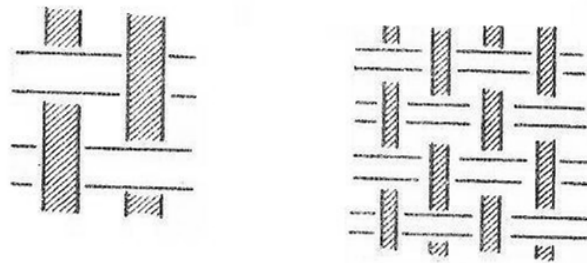


Figure 2: Interlacing pattern

1.2. 1.4.2 Point Diagram

These diagrams are usually employed in most cases to represent a woven structure. The standard textile design paper is ruled in groups of 8 x 8, these being separated by thicker bar lines as shown in figure 1.3. Each vertical square space is taken to represent a warp end and each horizontal space a weft pick, each square, therefore indicates an intersection point of an end and a pick.

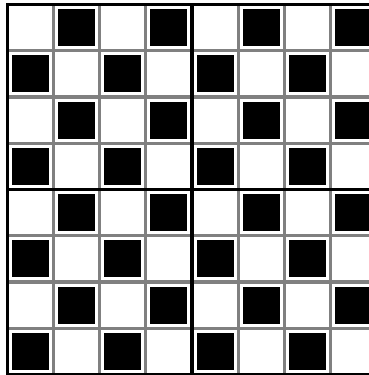


Figure 3: Point Diagram

1.3. 1.4.3 Sectional Diagram

The design on point paper conveys clearly the plan of interlacings in the repeat of a weave it cannot be used to indicate also the configuration of the threads in the cloth and in cases in which this is important the design may be supplemented by the fabric sections. Many compound structures cannot be properly understood without the use of sectional diagram. The use of such diagrams and their relationship with the design paper is shown in figure 1.4.

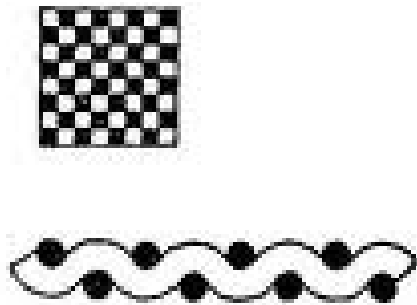


Figure 4: Sectional Diagram

1.4. 1.4.4 Weave Repeat Unit

Any weave repeats on a definite number of ends and picks generally only one repeat need be indicated on design paper. The number of ends and picks in a repeat may be equal, or unequal but in every case the complete repeat must be in rectangular form on account of the threads interlacing at right angles.

It is necessary for the marks and blanks to join correctly at the sides, and at the top and bottom of a design, in order that when the pattern is repeated in the loom from side to side and from end to end of the cloth an unbroken weave will result.

Commencing a weave at a different position does not in any way affect the appearance of the cloth but whatever the starting point a full repeat must be invariably given. An incomplete repeat, if used as the basis for a design, results immediately in a faulty construction as illustrated in Figure 1.7, F and G represent respectively the correct, full repeat and the effect of combining of several repeats to form a faultless cloth. H shows an incomplete repeat of the same weave and the fault is not very obvious in the single unit but it becomes immediately apparent when several of these faulty units are joined together as in I.

1.5. 1.4.5 Draft and Lifting Plans

A draft indicates the number of healds used to produce a given design and the order in which the warp ends are threaded through the mail eyes of the healds.

Lifting plan or peg plan defines the selection of healds to be raised or lowered on each successive insertion of the pick of weft.

The weave or design depends entirely upon the order of drafting in the healds combined with the order of lifting or lowering of the healds. The length of the design is normally limited to eight picks in tappet shedding while this limitation does not exist in dobby shedding where, theoretically, designs of any length can be produced.