The Construction Principle for Designing a Fabric with the Application of Extra Threads

Shariful Islam*1, Amirul Islam1, Suza Ahmed1, Shah Alimuzzaman1**, Mohammad Arif Billah2 and Rabeya Islam3

1Bangladesh University of Textiles, Bangladesh
2University of Chittagong, Bangladesh
3City University, Bangladesh

*Corresponding author: Shariful Islam, Bangladesh University of Textiles, Dhaka, Bangladesh, Email: sharifultextiles@gmail.com
Shah Alimuzzaman, Bangladesh University of Textiles, Dhaka, Bangladesh, Email: sazaman 2006@yahoo.com

Introduction

The importance of this project can be utilized when decoration or figuring is done in the base fabric by using extra threads through interlacement at intervals. The inserted extra threads of warp and weft do not have any effect on fabric property like strength and durability [1]. However, the extra threads are supposed to come out due to the repeated use and in any case of ordinary fabric the figuring is formed by the ground threads so the removal of any figuring threads does not affect the strength and durability of fabric. The extra yarn is permitted to float slackly on the back in the ground of the fabric. The prime objective of the extra warp technique is productivity, but currently it is mostly used for continuous styles, with an arrangement of one end of ground and one of extra; except dobby effects, which are still produced in a considerable variety of intermittent figuring arrangements. Many elaborated styles similar in appearance to extra warp, can be produced by means of extra weft figuring using standard harness sets and achieving the necessary variety by weft pattern changes [1]. Extra weft figured fabrics may be formed with one, two or more extra weft picks in addition to the ground weft. Only one series of warp threads is used and the effect is obtained by floating the extra weft where desired on the face of the ground cloth is produced by the interlacing of the warp with the ground weft in plain or in some other simple weave. Weaving loom should have the capacity to insert more than one weft for designing the fabric.

Method of positioning of the extra threads

This method is used when the space in between the figures is not excessive, when the ground is compact and when the fabric does not render the long floats on the back offensive. It is not appropriate to cloths where the ground is so light and transparent that the locations of the extra threads on the back can be apparent from the face side. The extra yarn is permissible to float slackly on the back, and is later cut down. This technique is fit for light ground textures if the extra threads floats slackly on the surface to form the decoration, it is essential for them to find at the boundaries of the figure, or the loose figuring floats will fray out from the ground [2]. The stable interweaving of the extra yarns at the edges, however, makes the outline of the figure less discrete, and is rather offensive unless employed in such a manner as to assist in forming the figure. In compact fabrics the extra threads are guaranteed in the bottom of the cloth, either between conforming floats in the ground texture, or through different stitching threads. The extra threads are interlaced on the face of the cloth in the form of small supplementary figures or floats thus adding to the fullness of the texture.

Designing a fabric with extra threads

Figuring with extra threads means to create different types of design on fabric with an extra one or more set of warp or weft threads in fabric. In below Figure 1 and in Figure 2, the decoration
is done by using extra threads, which are made to interlace with the ground fabric at intervals [3]. The extra threads can be inserted in warp way, weft way or in both the warp/weft way direction.

The prominent characteristics of these fabrics are that the removal of the extra threads from the cloth gives a complete ground structure under the figure. It is known that, if we insert extra threads, it will not create any effect on the strength or the durability of fabric. This extra threads should be visible in the fabric. Basically, in ordinary fabrics, the designing is done by the ground threads and the removal of any extra threads do not affects the strength and durability of the fabric [4]. Extra thread fabrics, especially, extra weft figured fabrics can create good-looking designs in bright and complementary colours (Figure 3).

The aim of using extra threads:

i. To produce broad design on the ground fabric

ii. To use bright colours of sharp contrast with ground

iii. Pleasing colour combination can be obtained

iv. To decorate the fabric with some specially prepared threads that can easily be identified

In below Figure 4 and Figure 5, the effect of extra figuring is shown. We can create different designing effect by the application of yarn of different type, yarn of different colour and different count. Different type of motif is also possible to show in the fabric by applying extra yarns. In Figure 4, some designing is done with the help of extra threads. Extra threads were used with the base fabric while interlacement. This extra yarns of different colour and types are used for decorating the fabric with some special appearance. If extra threads are removed, fabric design may not be present but ground fabric or base fabric will not be destroyed. Basically, extra threads are lustrous in nature as they are easily noticeable.

Method of using extra threads

Extra thread figured fabrics can be created by the below mentioned methods:

i. Extra warp yarns are used with ground warp threads

ii. Extra weft yarns are used with the ground weft threads
Procedure

To create an extra warp figured fabric, we need a separate warp beam besides the ground beam. The take up rates for the two beams will not be the same. To create extra weft figured fabrics, preferably the loom should be fitted with a multiple box mechanism like 4x1, 4x2 or a 4x4, depending on the weft colour requirement. The ratio may be 1:1, 1:2, 2:1 or 2:2 etc. that depends on the prominence of the figure needed [5].

Necessary requirement

The below mentioned things are compulsory in a loom to create extra warp figured fabrics:

i. Dobby shedding mechanism
ii. There should be two warp beams, where one is for ground warp and the other is for the figuring warp

The below mentioned things are compulsory in a loom to create extra weft figured fabrics:

i. Dobby shedding mechanism
ii. Drop box mechanism for ground and figuring weft
iii. Single warp beam - ground warp

Elimination of the excess figuring threads

Sometimes it is needed to eliminate the extra figured threads at places where they are not required. The below mentioned techniques are useful to eliminate the threads:

i. During manufacturing the fabric of light weight, the extra yarns are permitted to float loosely on the back with the ground fabric, which is cut away afterwards [6].

ii. During closely manufactured fabrics, the extra yarns are permitted to float tightly on the backside of the ground cloth. The extra threads are bound in on below the face side of the cloth by means of special stitching threads or by corresponding floats in the ground structure. This method is suitable for closely set fabrics [7].

iii. In some cases, the extra threads are woven as small figures with the ground at places where the regular figure is not desired.

Designing with extra warp threads

i. Extra warp technique is typically utilized for continuous styles that is arranged on one ground and one extra thread warp [8]

ii. Jacquard design in this technique is less accepted, because each different design most often needs the harness to be modified that is expensive.

iii. By using lower quality materials for the figuring threads, high expense can be reduced.

iv. Figuring with extra warps can be done with one or more than one color

v. Two set warp threads and one set weft set are needed. From the two sets of warp threads, one is used for base or ground fabric and the other set is for figuring or designing purpose in fabric.

vi. For two sets of warp threads, separate two beams are required

vii. The ground threads are passed through the front head frames and the extra warp threads are passed through the back head frames [9]

viii. The base/ground fabric is basically of plain weave

Construction principle

i. A motif is drawn on graph paper

ii. Repeat size is selected and for 1:1 ground warp and extra warp, warp in design repeat is twice of warp in motif and weft design is equal to weft in repeat

iii. In graph paper, base warp and extra warp are pointed

iv. The ground warp is plain weave and the extra warp will be the motif in extended form [10]

Advantages of extra warp threads

i. Production of loom is greater as, only one series of pick is inserted and a faster running loom can be used

ii. No need to use box motion or shuttle change mechanism

iii. No special picking, box and uptake motions are required

iv. There is theoretically limitation to the number of colours that can be introduced

v. In extra ends, either spotted or stripe patterns can be formed [11]

Disadvantages of extra warp threads

i. Two or more warp beams are required instead of using one

ii. In case of dobby shedding mechanism, drafting becomes very difficult

iii. The tension on extra warp threads are more so the yarns cannot be lustrous and soft

iv. Stronger yarns are needed for figuring yarns due to more tension [12]

v. Difficult to cut down the extra ends than picks

Application/uses

i. It is helpful to create fancy designed fabric

ii. It is used for both ends and ground of sarees

iii. It is sued for furnishing fabrics in coarser fabrics

iv. It is also used for making dresses and designed fabric [13]

Extra warp figuring with single colour

Simple effects are created by using a single colour extra warp. In the below mentioned figure, there is a motif design of the extra
warp threads with red colour. Blue colour shows the base/ground fabric that is of plain weave. Here, other weaves may also be used for creating ground fabric. The repeat size of the extra figure is 8x8. The repeat of the plain portion is 8x8. So, the repeat size of the final design is 16x8. In base/ground of extra warp figured fabrics, it is generally mandatory for the extra threads to be invisible from the face side, and they can be floated loosely on the back side. A Figure 6 is given below for the effect of extra figuring with single colour [14].

![Figure 6: Extra figuring with single color.](image)

**Extra warp figuring with double colour**

Extra figuring with Double colour technique can be used to weave jacquard design to get a width of repeat, which appears to need twice as many needles as are really needs. This method can also be used to create a large repeat in dobby shedding mechanism. There is a classic design of an extra warp design with two colours is shown in the below mentioned Figure 7. “A” shows the figuring motif. “B” shows the division of two extra figuring warps [15]. C shows the ground fabric having plain weave. D is the final design that is the combination of all these three by “A”, “B” and “C”. The ratio of the ground to figuring threads is 1:1. The size of the final repeat is 20x8.

![Figure 7: Extra figuring with double colour.](image)

**Figuring with extra weft threads**

i. In figuring with extra weft threads, ornamentation is done by the weft yarns.

ii. Two sets of weft threads are needed where, one set for is for base/ground fabric and the other set is for creating designed effect [16]

iii. Extra weft for designing will be inserted with the ground/base weft yarn

iv. The Extra designing effect can be done by the application of one, two or more picks with ground cloth.

v. Ground weft may be plain or some other simple weave order

vi. The weaving machines should have the capacity to insert more than one coloured of weft yarns

vii. Normal drafting is used

viii. One warp beam is required with one set of warp ends
**Construction principle**

i. A motif is drawn on graph paper

ii. Repeat size is selected and for 1:1 ground warp and extra warp, weft in design repeat is twice of weft in motif and warp in design is equal to warp in repeat

iii. In graph paper, ground weft and extra weft are pointed [17]

iv. The ground weft is plain weave and the extra warp will be the motif in extended form

**Advantages of extra weft threads**

i. No extra beam is required

ii. As the tension on weft yarn is less, required of lustrous and fine weft threads

iii. In dobby weaving, fabric can be easily created by using normal drafting

iv. Removing of extra picks are easy compared to extra ends [18]

v. The appearance of threads in fabric is high because of more shrinkage

**Disadvantages of extra warp threads**

i. Box motion and shuttle changing mechanism are required

ii. More number of coloured threads are not used due to the use of box motion

iii. The speed of loom is lower and production capabilities is also lower

iv. Two or more weft feeders are required instead of using one

v. Complex to use various lustrous and soft yarns in weft way [19]

vi. The productivity of loom is less as, two or more sets of various coloured picks are inserted during weaving

vii. Stronger and different types of fancy yarns are needed for figuring yarns

**Application/uses**

i. It is helpful to create fancy designed fabric

ii. It is used for both ends and ground of sarees

iii. It is used for furnishing fabrics in coarser fabrics [20]

iv. It is also used for making dresses and designed fabric

**Extra weft figuring with single colour:** Simple effects are created by using a single colour extra weft. In the below mentioned figure, there is a motif design of the extra weft threads with red colour having serial number a-h. Blue colour shows the base/ground fabric that is of plain weave having serial number 1-8. Here, other weaves may also be used for creating ground fabric. The repeat size of the extra figure is 8x8. The repeat of the plain portion is 8x8. So, the repeat size of the final design is 8x16. In base/ground of extra weft figured fabrics, it is generally mandatory for the extra threads to be invisible from the face side, and they can be floated loosely on the back side [21]. A Figure 8 is given below for the effect of extra weft figuring with single colour.

![Figure 8: Extra weft figuring with single colour.](image)

**Extra weft figuring with double colour:** Double colours of weft can be used by feeding or inserting two coloured yarns during weaving. A weft insertion mechanism will be used that will insert two different coloured of weft yarns one after another. Basically, base/ground fabric is woven with plain weave and figuring is done with required or some other weave. There is a classic design of an extra weft design with two colours is shown in the below mentioned Figure 9. “A” shows the figuring motif. “B” shows the division of two extra figuring wefts. C shows the ground fabric having plain weave.

![Figure 9: Extra weft figuring with single colour.](image)
Comparison in between extra warp figuring and extra weft figuring

**Physical comparison:** Extra warp threads are used in warp way where, Extra weft threads are used in weft way. Additional shuttle box and special take up mechanisms are not needed on the other hand, drop box with modified take up mechanisms are needed in extra figuring. For figuring with Extra warp two sets of warp threads and one set of weft thread are required, where in weft figuring, two sets of weft threads and one set of warp thread is required. For extra warp figuring, more than a beam is needed, alternately, in weft figuring, needs only a single warp beam [23]. For extra figuring, production is higher because only one type of weft is inserted alternately in extra figuring production is lesser because more than two type of weft is inserted. Loom speed is high due to one set of weft, so production is high in warp figuring. Loom speed is low due to two or more set of weft threads, so production is less in weft figuring [24]. Striped and spotted effects can be done by alternately arranging the figuring threads alternately in weft figuring, spotted effects are possible but striped effects are not possible. Very good strong warp yarns are required in warp figuring. Yarns of good strength are not necessary in weft figuring.

**Procedural comparison:** Generally draft plans are more complicated in warp figuring, but draft plans are simpler in weft figuring. Figuring effects is less prominently visible in warp figuring but in weft figuring, figured effects show more prominently. No limitation of use of more number of coloured ends are possible but in weft figuring, more colour picks cannot be used as feeders can insert only 6 to 8 colours [25]. Tension on extra warp is more, so cannot use of lustrous and soft yarns in warp figuring, alternately, tension on extra weft is less, so use of lustrous and soft yarns is possible in weft figuring. It is more difficult and expensive to dispose the extra threads at places where they are not required in warp figuring, but in weft figuring, the removal of extra weft threads is easier and more economical [26]. Possess a constraint in repeat size when working on an ordinary type of jacquard where no such problems are occurred in weft figuring. Extra warp figuring fabrics mainly creates stripe fabric where, Extra weft figuring fabrics mainly creates check/ cross over fabrics. In warp figuring, scope for introduction of more colours where in weft figuring, Scope for colouring is restricted to capacity of shuttle boxes [27].

Conclusion

At last we can say that, designing a ground fabric with extra threads is a common practice that we are continuously doing through decades. Special types of yarns were used in project those could well decorate the base fabric by increasing attractiveness, gorgeousness and appearance of fabric. One of the most important discussions was that, the removal of the extra threads from the cloth gives a complete ground structure under the figure and also the removal of extra threads from the base fabric does not create any harm to the fabric or it does not reduce strength, firmness or rigidity of fabric. Also, the inserted extra threads of warp and weft does not have any effect on fabric property like strength and durability. It was seen that; the extra yarns were permitted to float slackly on the back in the ground of the fabric. Outstanding improvement can be possible by taking distinct attention in this area that can find out new way to designing a fabric with extra threads.

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