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RESEARCH ARTICLE

Getting Double Sides Figured Fabrics made of Three Wefts and One Color Warp

Eman Fadl Abd Elhakam aieob

Department of Spinning, Weaving and Knitting, Faculty of Applied Arts, Helwan University, Egypt.

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Corresponding Author

Eman Fadl Abd Elhakam aieob.

Abstract

The two-sided fabric used gives the consumer, opportunity to use in various purposes; separating curtains between two rooms or aisles, double face clothes and upholstery cloth used on two sides in some furniture design. So that the consumer can save additional cloth, tailoring cost, also gives him other additional various use.

Often, the local manufactured textiles is used common only one face and can't be used the two faces with the same efficiency. Because of the lack studies which interested in developing of double face patterned fabrics, this study focuses on setting of the textile structural solutions to give a variety of technical colorful values for the two faces textile cloth faces according to artistic vision of design. We use normal weaving looms of one color and three wefts using color order to produce the proposed product.

And the data statistical analysis which was resulted from a questionnaire that was especially designed for this purpose showed that the produced fabrics had a lot of arbitrators' approvals, also met the study purpose. In addition to the technical and professional analysis of the produced textile & the questionnaire analysis, we could obtain on the below next results: -

- Obtaining on patterned fabrics has technical values of both sides.
- Producing patterned fabrics, we can employ them on the two sides with the same efficiency which was produced of: three wefts and one color warp for example (samples of five and six colors in addition to sample of eight colors of both the upper face and the lower face).
- Four designs producing of patterned double face (Some of these fabrics have a design face is similar to their back design and others their face design is not similar to their back design).
- Obtaining on the pile effect & the implication of a prominent and low-impact of the two fabrics sides.
- The samples (2, 3, and 4) achieved outstanding positive results towards research aims, comparing with the sample (1) according to the questionnaire results analysis.

- **Keywords :-**

Double Sides Fabrics - Figured Fabrics - Development - Technical Artistical Dimensions of Textile Fabrics - extra weft - Waddin Weft

- **Search problem :-**
  - The local produced fabrics, on Jacquard machines, were commonly used only one face and could not be used on the two faces with the same efficiency.
  - The previous studies and researches did not care enough of developing double face figured fabrics to obtain technical values for these fabrics.
- **Research aims :-**
  - Developing double face figured fabrics to obtain on technical values which increase their effectiveness and competitiveness

- The efficient usage of Jacquard looms with one warp beam and one color.
- To use the over left threads and raw materials of factories as wefts to increase the factories profits and decrease the losses (enhancing factory economics).
- To get a new creative color and technical effects to enrich the figured fabrics.

- **Research importance :-**

- Increasing of the competitiveness ability through developing of double face figured fabrics of textile products

- **Research Methodology : -**

The research depends on the experimental - analytical method.

Introduction:-

There is a very bad need and very deep concern to catch developing and enhancing of the textile designing and technology, so that concern imposes on us developing our textile products to get the high levels which keep their competitiveness and prove their abilities in the competition field. Also the success of textile manufacturing depends mainly on the ability of designer to create, thus the fabrics designer has to think seriously and continually to develop patterned double face fabrics which is considered one of the most important fabrics kinds, through setting various structural solutions and with standards executive specifications to obtain on the double face fabrics patterned have ability to be used and employed on the two sides with the same efficiency and the same technical values to fit the various uses, also to make these fabrics, contribute in enhancing the competitive efficiency locally or over the world [1].

Moreover, the textile designing is considered a design which converts the interlacements of yarns or threads to textile fabrics so this structure form converts the enriched figure to cloth, also gives the actual imaginations of colors mixture through the proposed design. And the designer has to put his mind the functional or professional purpose of the design, abilities and the available materials according to the good modern designing. So the figure design is not separated of the function, also the two sides (aesthetic and functional) cannot be separated of each other and the designer has to care of the product availability to fit the functional purpose which was designed for.

The idea which keep to use the fabrics on their two faces with colors variety is mainly built on the case of not using the double face fabrics as curtain separates between two rooms or aisles, so we can use them in the décor purposes or the internal furnishing for example: we can use one of the both fabric faces in the upholstery making of some furniture which was designed to use cloth for covering and we can change it to the other face to save extra cloth cost for consumer in addition to tailoring and fixing expenses…etc. also give the consumer free to use the face which fit him and meet the purpose that the fabrics type was chosen for, in addition to the specific colors group especially the most spreading color or two colors which appear in a variety exchanging colors of the two fabric textile faces [2].

Also using of Jacquard looms with one warp beam and increasing colors number for warp (to enhance the technical enrich for product), that works on decreasing the cover rates of the one color density by measurement unit and decreasing the different variety design of one color which negatively affect on fabrics, the appearance designing and the movement style for it in addition to the difficulty to change or increase warp colors after the interlaced process. Thus affects negatively the modernizing effectiveness and competitiveness, so that we can benefit of the proposed interlaced methods to get a variety designs which will be mentioned later in the research experiments.

The technical affects is made in the textile piece through: -

- The italic lines or the fabric figure which has italic plaids & structures making and the interlacement between them by using the main rules of the textile structures and their derivatives in addition to the creation in them.
- Using additions to achieve the technical enrich of the textile fabric piece and to meet the main purpose (providing the technical value with its all concepts to enhance the professional activity through the textile structure figure).

So this research will discuss the textile interlaced methods which may appear on the two faces with same efficiency to enrich the technical and professional that kind of fabrics (double face).
Also the researcher discuss other methods which is suitable to produce that fabrics kind like the methods which depend on the extra weft rule and the double textiles & combining between them and the other graving structures of warp or weft. These methods is featured by producing double face fabrics in addition to getting textiles have designs on their face is similar to their back and on the other hand is not similar to their back in (the materials and the textile structures or both of them with the same efficiency) according to the usage kind which is decided for it like napkins, curtains or upholstery fabrics.

Extra weft weaves: -
The extra weft consists of main warp and main weft to make the lower basic textile then added extra wefts which interfere with main wefts according the required order to appear float or stitched on fabrics face in graving areas according to used textile structures order to determine the interlacing rates with warp yarns which control in their appearance on the cloth surface then disappear in the back in clear areas of graving without interfering in the lower basic textile. Also it maybe float or cohesive with the lower basic warp by cohesive method does not affect on the fabric face or adding technical dimensional on the lower basic textile which is appeared on the fabrics surface. Also the extra wefts colors maybe vary between continuous-filament yarns or separated towards the vertical direction on along textile according to the design. The lower basic textile maybe made of ribs, twill, stain or any other required structures textile according to the design executive dimensional [3] . In addition to the availability to cut the extra and float yarns of the fabric back and to keep the graving only of the fabric back in condition to cohesion the extra wefts on the used decorated boarders of the fabric face of ribs 1/1 [4], [5].

Double weaves: -
The multi layers textiles is considered compound textile, consists of two cloths pieces or more, also the layers or pieces are cohesive and separated each other. Every layer may exchange to appear on the textile surface and make the graving according to the required design thought. Also we can use different textile structures to operate the dual textiles (double face) generally, which may have a face design is similar to its back design or is not similar to its back, moreover it may have different or identical of (number and kind of yarns which is set on the textile face and the back textile). And there is no doubt that the all mentioned cases or some of them have to fit the textile kind, usage and the purpose which is made for. Moreover, the multi layers textile provides several of colorful and aesthetic features as a result of the face and back fabric exchanging which gives the designer a big availability to create various designs [6].

The dual fabrics has many usages properties, is not found in the only layer fabrics, so we can get more weight and more thickness, in addition to the warm feature and the final figure quality which depends on various creative designs and different figured according to the designs of the two layers. Thus the main value of these fabrics is producing variety designs and their impact textiles in addition to the dual fabrics have a high tenacity. So these cloth is used to make warps fabrics to produce the high quality coats and jackets in the winter. Moreover, the dual fabrics has high ability to fit the three dimensional bodies more than the one layer fabrics in addition to the dual fabrics are used to produce army wears, rug, upholstery, curtains and sound isolation fabrics [7].
And the most important uses of the multi layers fabrics: -

- The figured curtains.
- The bed covers and table sheets.
- Some of the ladies cloth.
- Bags, tapes and hoses.
- Some of the other industries [6].

The factors which enrich the textile aesthetics: -
The applied factors which are relevant with the textile fabrics or the executive techniques like the formative technical factors that are set under the plastic art rules and bases in addition to the autistic common sense. And some of the applied factors are:

The textile material effect:-
The textile material affect is one of the most main important elements to complete the textile process, so the materials affects directly in the textile structure on the two levels (the aesthetic level and the applied level). Firstly, the aesthetic level, the materials achieves variety of touching through the textile structure, also achieves variety of

the light reflection degree according to the different degree of absorbing light of each material. Secondly, the applied level affect on the textile structure through the natural materials features, thus the designer known of the material natural and its features, make him able to deal with and form it in right way which fit its features through the textile structure.

The impact of the variety textile structures: -

The impact of variety textile structures is considered one of the main elements to enrich the textile aesthetics through the relation between the touching and rhythm, also the variety of the textile structures affects on the other textile structure which is close for. In addition to that impact achieves touching variety and its rhythm achieves variety of the light reflection degree on fabric surface as result of the outstanding and the lowing of yarns movement during fabric making.

The impact of the textile colorful: -

The yarns colors extremely affect on the textile appearance, the effect degree makes us cannot distinguish the original textile unless we do examining. Also that effect gives many different figures that are not easy to be found in the normal methods. Moreover it helps to make warp color is different about weft color so it able us to many arrangements of the both colors. We can obtain on wonderful colorful textile impacts If we choose the fitting textile structure and put colors order system with their various degrees in both of warp and weft to make all of the previous mentioned elements, fit purpose of the fabric final usage.

- **The obtaining methods on the textile and aesthetic impact were determined through the next: -**

- The touches number : is achieved through using touches which enrich of the textile piece appearance that are made by variety wefts of the thickness, weaving of figured areas or new creative forming of the textile method.
- The contrast : is achieved through using different materials, different colors in addition to the textile variety. Also the researcher can get on many affects through exchanging and combining together.
- The third dimension : is made of contrasting between: -

a. The design parts to achieve contrast and different between the outstanding and the graving & the vertical and the horizontal lines.
b. The contrastive colors.
c. The different material (feature, kind, thickness).
d. The third designing dimension to achieve appearance full of the different shades and imaginations as a result of the light reflection on the surface which has outstanding lines.

- **The dimensions fixing: is done by**

a. Fixing and strong of the textile through the impact textile structures.
b. Distributing the figured in design with balance.
c. Using materials has high durability and threads have fitting yarn count to achieve tenacity [8].

The practical experiments of the research: -

The experiments and practical steps have been set to fit the study objectives achieving through using the proposed interlaced textile methods which would show the two textile sides of the same efficiency. Made by using a loom equipped with warp beam single-color and using three wefts color ordered as (a: b: c).

The two followed tables show Loom and Jacquard device specifications used in experiment:

Table (1) shows the used loom to produce the research samples :-

Loom & Preparation	Somet Italian - type excel – manufacture year 1997
Machine speed	280 picks / min
Jacquard device type	Staubli-force 1344 X 2 hooks, the actual power in1200X2
Jacquard Draft and repetition numbers	Directly proportional – Number of repetitions = 4
Repetition width	36.3 cm
Denting	11 heddle per cm - 6 threads per heddle

Table (2) shows the warp and wefts specifications to produce the research sample:-

Warp width in the reed	145 cm +1 cm per side(Selvedges)
Warp type & its number	twisted polyester – 100 /1 Denier
warp equipment	66 threads / cm
Wefts density	experiments(1، 2 ، 4) 48wefts/cm-experiment(3)28 wefts/cm
wefts materials	Febran for experiments (1 ،2 ، 4) & Fbebran and chenille for experiment(3)
Wefts Order	1A: 1B: 1C

The first experiment :-

The experiment was implemented by the aforesaid specifications in table (1),(2), in addition to wefts no. 30/2 (cotton numbering), density 48 wefts/cm and color ordered of wefts (a: b: c) (red: blue: green). The sample was implemented by three textile structures and shown in (1), (2), (3) shapes as follows:-

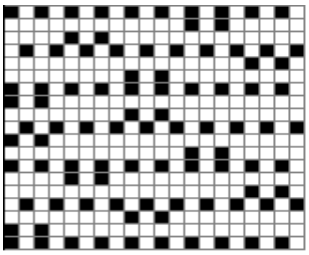


Figure (1) [9]

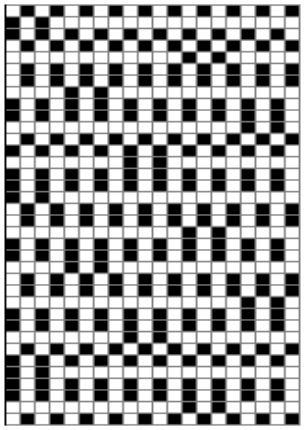


Figure (2)

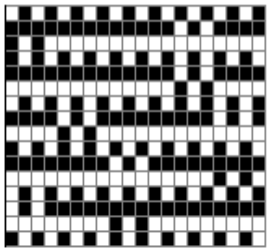
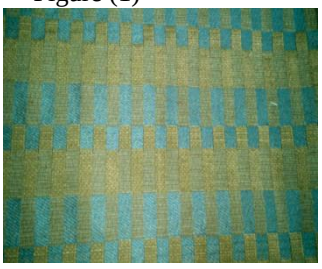


Figure (3)



(a)

(b)

Figure (4 a - b) Show the two photographs of front & back sample faces, which were implemented in the first experiment

The Technical and Practical analysis of the first experiment produced sample:-

Figure (4 a- b) shows the design as a horizontal and vertical strips which crossed perpendicularly. The sample shows three colors of its two faces despite of using one color warp (yellow) and three wefts ordered color (green: blue: red) according to the interlaced textile structures. Also Figures (1, 2 and 3) describe the textile structures used in the implementation of this experiment.

From the produced sample we notice that the sample integration (Cohesion) is increased according to the increasing density of wefts per cm (the number of wefts 48 wefts / cm) as well because one of wefts working plain weave 1/1 (structures (1) ،(3)) and this helped to increase the produced sample integration. Also, the contrast between some figured spaces in both sides of the sample is weak**.**

Table (3) shows the relationship between colors of the resulted sample by interlaced textile structures & warp and weft colors.

Used textile structures	Structure No. 1 shown in Figure (1)	Structure No. 2 shown in Figure (2)	Structure No. 3 shown in Figure (3)
The upper face colors of the sample	Resulted color of mix two wefts b , c (Blue- red)	Resulted color of mix a warp and a weft (b) (yellow + blue)	The appearance of blue color (weft b)
The lower face Colors of the sample	Resulted color of mix weft (a) and warp(green-yellow)	Resulted color of mix weft (c) and warp (red -yellow)	The appearance of the red color (weft c)

The next below: a minute explanation details of the used structures textile to carry out this experiment and the shown colors are extremely cleared in the previous table no (3): -

- Appearance of colorful areas of the upper face fabric [resulted color of the two wefts mix b, c (Blue - red)], also appearance of colorful areas of the lower face fabric [resulted color of weft (a) and a warp mix (green - yellow)] by using the textile structure which is shown in figure no. (1). It is cleared that the appearance of the two wefts (b and c) on upper face fabric as result of the wefts (b and c) are made of 5- End stain structure and extended twice towards the weft, in addition to the weft (a) is made of 1/1 Ribs.
- Appearance of colorful areas of the upper face fabric [resulted color of a warp and a weft (b) mix (yellow + blue), also appearance of colorful areas of the lower face fabric [resulted color of weft (c) and a warp mix (red - yellow)] by using the textile structure which is shown in figure no. (2). So the weft (a) is made of 1/1 Ribs, the second weft (b) is made of 5- End stain structure and extended twice towards the weft, in addition to the third weft (c) is made of 3/3 Ribs extended towards the vertical direction.
- Appearance of colorful areas of the upper face fabric with the weft color (b) (blue), also appearance of colorful areas of the lower face fabric with the weft color (c) by using the textile structure which is shown in figure no. (3). So the weft (a) is made of 1/1 Ribs, the weft (b) is made of 5 wefts- End stain structure and extended twice towards the weft, also the weft (c) is made of 5 warps - End stain structure and extended twice towards the weft.

The second experiment:-

The experiment was implemented by the aforesaid specifications like the first experiment in table (1),(2), in addition to wefts No. 30/2 (cotton numbering), density 48 wefts/cm and color ordered of wefts (a: b: c) (red: blue: green). The variables in this experiment are based on the used textile structures. The number of used textile structures is five and illustrated in figures No's (5), (6), (7), (8) and (9)) as follows:-

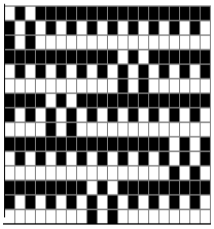
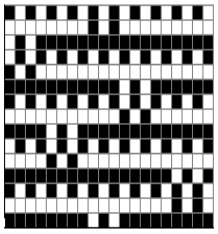


Figure (5)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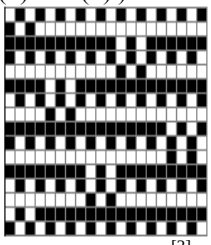


Figure (7) [3]

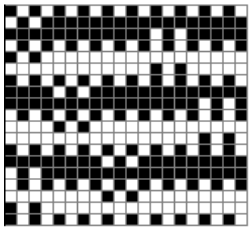


Figure (8)

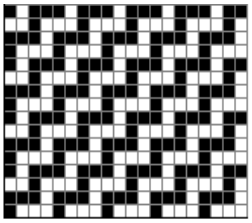
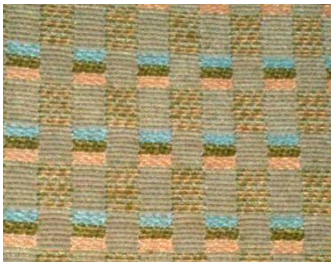


Figure (9)


(a)

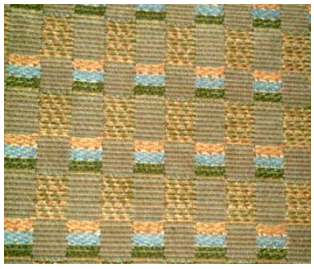

(b)

Figure (10 - a, b) Shows the two photographs of front & back sample faces, which were implemented in the second experiment.

The Technical and Practical analysis of the second experiment produced sample:-

Figure (10 a , b) shows the design in squares as a horizontal and vertical strips which crossed perpendicularly. The sample shows five colors (three essential colors of its two faces and two additional meshed colors) despite of using one color warp (yellow) and three wefts (a: b: c) ordered color (red: blue : green) according to the interlaced textile structures.

Also Figures (5, 6, 7, 8 and 9) shows the variable of the textile structures used in the implementation of this experiment.

Table (4) shows the relationship between colors of the resulted sample by interlaced textile structures & warp and weft colors.

Used textile structures	Structure No. 1 shown in Figure (5)	Structure No. 2 shown in Figure (6)	Structure No. 3 shown in Figure (7)	Structure No. 3 shown in Figure(8)	Structure No. 3 shown in Figure (9)
The upper face colors of the sample	The appeared Color is red (weft color (a))	The appeared color is Blue (weft color (b))	The appeared color is Green (weft color (c))	The appeared color is weaving of wefts (B + C)	The appeared color is weaving of warp and wefts (A + B + C)
The lower face colors of the sample	The appeared color is green (weft color (c))	The appeared color is red (weft color (a))	The appeared Color is blue (weft color (b))	The appeared color is weaving wefts (B + C)	The appeared color is weaving of warp and wefts (A + B + C)

The next below: a minute explanation details of the used structures textile to carry out this experiment and the shown colors are extremely cleared in the previous table no (4) : -

- Appearance of colorful areas by using the shown textile structure in figure no. (5). So the color weft (a) appeared by red color on the upper face fabric that is made of 5- End stain structure and extended twice towards the weft, also the weft (b) appeared by (blue color) is made of 1/1 Ribs, in addition to the color weft appeared by green color on the lower face fabric that is made of 5- End stain structure and extended twice towards the weft *s.*
- Appearance of colorful areas by using the shown textile structure in figure no. (6). So the color weft (b) appeared by blue color on the upper face fabric that is made of 5- End stain structure and extended twice towards the weft, also the weft (a) appeared by (red color) on the lower face fabric that is made of 5- End stain structure and extended twice towards the weft, in addition to the weft (c) is made of 1/1 Ribs.
- Appearance of colorful areas by using the shown textile structure in figure no. (7). So the color weft (c) appeared by green color on the upper face fabric that is made of 5- End stain structure and extended twice towards the weft, also the weft (b) appeared by (blue color) on the lower face fabric that is made of 5- End stain structure and extended twice towards the weft, in addition to the weft (a) is made of 1/1 Ribs.
- Appearance of colorful areas by using the shown textile structure in figure no. (8). So the mix color of two wefts (b) and (c) appeared by (blue and green colors) on the upper face fabric that are made of 5- End stain structure and extended twice towards the weft, then the mix color of two wefts (b) and (c) appeared by (blue and green colors) on the other face fabric that are made of 5- End stain structure and extended twice towards the weft, in addition to the weft (a) is made of 1/1 Ribs.
- Appearance of colorful areas of the mix color between the warp and the three wefts (a, b and c) appeared by (yellow, red, blue and green) that is shown in figure no. (9).

The third experiment:-

This experiment used the same specifications of the first experiment given in Tables (1), (2). In this experiment one color warp (brown) and a wefts of colors ordered (a: b: c) (White: Red: brown) (2 wefts:" ordinary" and weft:"S pictorial chenille") are used. The variables in this experiment are based on the proposed textile structures type of wefts no. Six textile structures of different textiles as described in figures (11), (12), (13), (14), (15) and (16) are used. The used weft number is 28 wefts / cm.

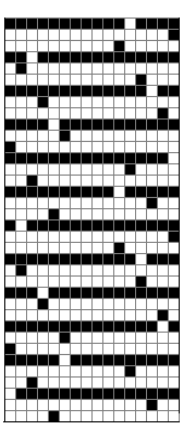
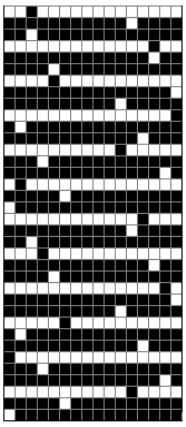


Figure (11)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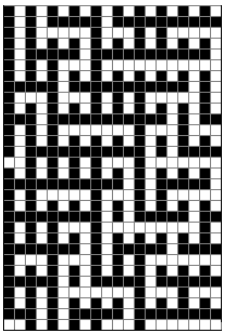
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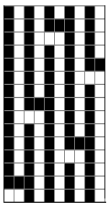
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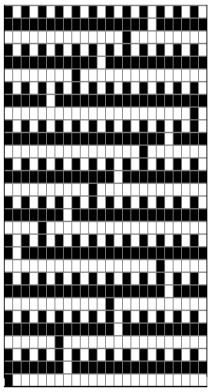
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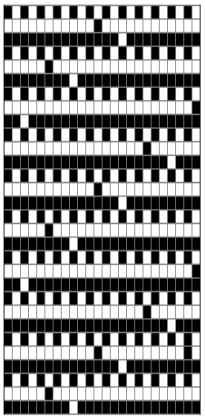
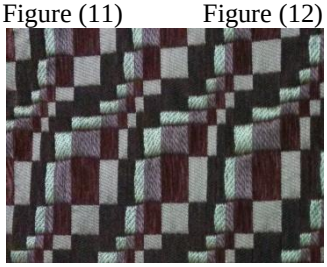


Figure (16)


(b)


(b)

Figure (17 - a, b) Shows the two photographs of front & back sample faces, which were implemented in the third experiment.

The Technical and Practical analysis of the third experiment produced sample:-

Both front and back faces of the produced sample were shown in figures (17 a, b). The design structure relied on perpendicularly vertical and horizontal strips with a gradual decreasing in the vertical direction towards the top. Iterated and organized spaces are adopted where the repeated decreasing of the horizontal strips sizes in the vertical direction gives the sense of movement in the design.

According to the proposed textile structures, the implementation of this experiment using one color warp (brown) and color ordered of the wefts (white: Red: brown): (2 ordinary wefts and weft:"chenille"). The sample appeared of six colors on each face. Also, the pile effect appeared giving the impression of prominent and low-impact on both sides of the woven, in addition to the existence of a glitter illustrates the degree of light reflection on the textile in some areas. Also there are color shades due to the textile structures and their relationship with the different used materials.

Figures (11, 12, 13, 14, 15 and 16) describe the textile structures used in this experiment.

Table (5): Shows the relation between the resulted sample colors which were implemented by the textile interlaced structures & colors of wefts and warp:

Used Textile structures	Structure No. 1 shown in Figure (11)	Structure No. 2 shown in Figure (12)	Structure No. 3 shown in Figure (13)	Structure No. 3 shown in Figure (14)	Structure No. 3 Shown in Figure (15)	Structure No. 3 shown in Figure (16)
The upper face colors of the sample	Appearance: Mix color of two wefts (A + B) (White + red)	Appearance: Brown color of the Shanlia weft (C)	Appearance: Mix color of warp and the weft (A) (brown + white)	Appearance of the Warp Color (brown)	Appearance of the weft (a) color White color	Appearance of the weft color (Red color) (b)
The lower face colors of the sample	Appearance: brown color of Shanlia weft (C)	Appearance: Mix color of weft (A + B) (white + red)	Appearance: Mix color of warp and weft(B) (Brown + red)	Appearance of the warp color (brown)	Appearance: Red color of the weft (B)	Appearance: white color of the weft (a)

The next below: a minute explanation details of the used structures textile to carry out this experiment and the shown colors are extremely cleared in the previous table no (5): -

- Appearance of colorful areas by using the shown textile structure in figure no. (11). So the mix color of two wefts (a) and (b) appeared by (white and red colors) on the upper face fabric that the two wefts (a and b) are made of 12 wefts - End stain structure, in addition to the third color weft appeared by brown color on the lower face fabric that is made of 12 warps - End stain structure.
- Appearance of colorful areas by using the shown textile structure in figure no. (12). So the third color weft (c) appeared by brown color on the upper face fabric that is made of 12 wefts - End stain structure, also the mix color of two wefts (a) and (b) appeared by (white and red colors) on the lower face fabric that the two wefts (a and b) are made of 12 warps - End stain structure.
- Appearance of colorful areas by using the shown textile structure in figure no. (13). The mix color of warp and weft (a) appeared by (brown and white colors) on the upper face fabric so that the upper face fabric is made of the graving dual method, yarns ordered by (yarn for upper and yarn for lower face) and wefts ordered by (weft for upper and weft for lower) that make the upper face fabric (figured structure). On the other hand, the mix color of warp and weft (b) appeared by (brown and red colors) on the lower face fabric which is made of (twill $\frac{2\,5}{2\,1}$).
- Appearance of colorful areas by using the shown textile structure in figure no. (14). So the brown color appeared on the upper and lower face fabric that is made and shown by graving dual structure (the upper face is made of 5 warps – end stain and the lower face is made of 5 wefts – end stain), yarns ordered by (yarn for upper and yarn for lower face) and wefts ordered by (weft for upper and weft for lower), in addition to the color order of wefts(a:b:c)(2normal wefts then weft "chanelle").
- Appearance of colorful areas by using the shown textile structure in figure no. (15). The color weft (a) appeared by white color on the upper face fabric and the color weft (b) appeared by red color that shows the graving dual textile; yarns order (yarn for upper and yarn for lower face), wefts order (a:b:c)) (2 normal wefts : weft "chanelle"). So the weft (a) is made 12 wefts – end stain, the weft (b) is made of 12 warps – end stain and the weft (c) is made as padding.
- Appearance of colorful areas by using the shown textile structure in figure no. (16). The color weft (b) appeared by red color on the upper face fabric and the color weft (a) appeared by white color on the lower face fabric that show the graving dual textile; wefts order (a:b:c)) (2 normal wefts : weft "chanelle") . So the weft (a) is made 5 warps – end stain, the weft (b) is made of 12 wefts – end stain and the weft (c) is made as padding.

The fourth experiment:-

This experiment was carried out using the same specifications which used in the first experiment as shown in Tables (1), (2). We used one color warp (yellow), weft density: 48 wefts/cm, thread no.: 30/2 (cotton numbering) and color ordered of the wefts (a: b: c) (Blue: Yellow: brown). Also used 8 different textile structures indicated in figures no. (18), (19), (20), (21), (22), (23), (24) and (25).

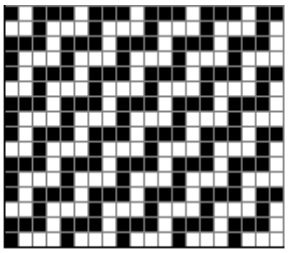


Figure (18)

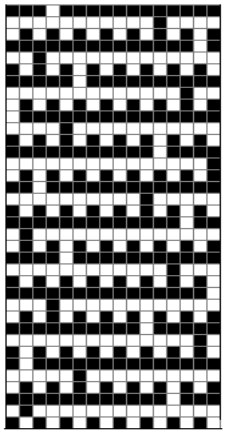


Figure (19)

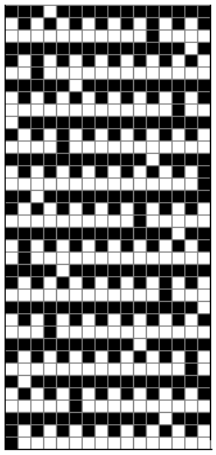


Figure (20)

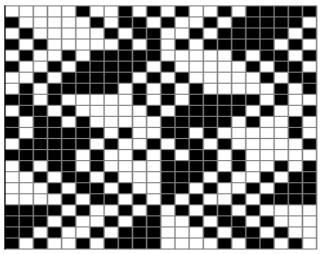


Figure (21) [5]

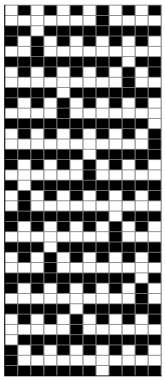


Figure (22)

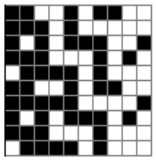


Figure (23)

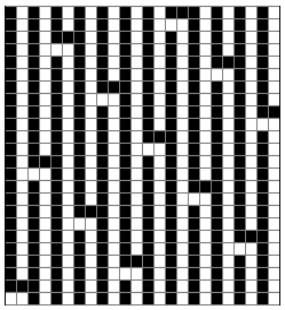


Figure (24)

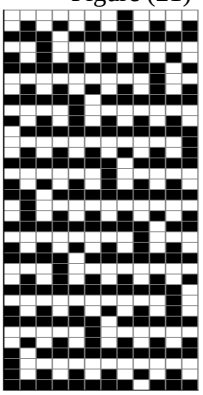
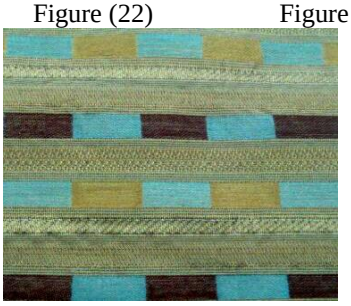


Figure (25)


(a)


(b)

Figure (26 - a, b) Shows the two photographs of front & back sample faces, which were implemented in the fourth experiment.

The Technical and Practical analysis of the fourth experiment produced sample:-

The face and back of produced sample are shown in figure (26 – a, b). In spite of using the same previously used specifications of one color warp (yellow) and three wefts with color ordered (a: b: c) (blue: yellow: brown). It is clear that the results of this experiment were better than those of the first one, in terms of the design of the face and the back where we get eight colors on each face of the sample. Through the interaction of the textile structures and materials, we achieved artistic and colorful values that show grading colors and glittering which explain the degree of light reflection on the textile.

Table (6): Shows the relation between the resulted sample colors which were implemented by the textile interlaced structures & colors of wefts and warp:

The used textile structures	Structure No. 1 shown in Figure (18)	Structure No. 2 shown in Figure (19)	Structure No. 3 shown in Figure (20)	Structure No. 4 shown in Figure (21)	Structure No. 5 shown in Figure (22)	Structure No. 6 shown in Figure (23)	Structure No. 7 shown in Figure (24)	Structure No. 8 shown in Figure (25)
The upper face colors of the sample	Appearance : Output color of Mixing warp With wefts (A + B + C) (Yellow + Blue + Brown)	Appearance : Yellow Color like weft color(B)	Appearance :Blue Color Of weft(A)	Appearance : Output color of mixing warp with Wefts (A + B + C) (Yellow + blue + Brown)	Appearance :Yellow Color like weft color(B)	Appearance: Output color of mixing warp with Wefts (A + B + C) (Yellow + blue + Brown)	Appearance :Yellow Color like Warp color	Appearance :Brown Color like weft color (C)
The lower face colors of the sample	Appearance : Output Yellow color of Mixing warp With wefts (A + B + C) (Yellow + Blue+ Brown)	Appearance : Brown Color like weft color (C)	Appearance: Brown Color like weft color (C)	Appearance : Output color of mixing warp with Wefts (A + B + C) (Yellow + blue + Brown)	Appearance:Blue color like weft color (A)	Appearance: Output color of mixing warp with Wefts (A + B + C) (Yellow + blue + Brown)	Appearance:Yellow Color like Warp color	Appearance:Blue Color like weft color(A)

The next below: a minute explanation details of the used structures textile to carry out this experiment and the shown colors are extremely cleared in the previous table no (6): -

- Appearance of colorful areas on the upper and lower fabric faces resulted of the mix color of warp and three wefts (a, b and c) (yellow, blue and brown colors) by using the shown dual structure in figure no. (18). Also yarns ordered by (yarn for upper and yarn for lower face) and wefts ordered by (weft for upper and weft for lower).
- Appearance of colorful areas on the upper fabric face of the color weft (b) appeared by yellow color that is made of 12 wefts – end stain, also the lower fabric face of the color weft (c) appeared by brown color that is made of 12 warps – end stain, in addition to and the weft (a) is made as padding by using the shown figure no. (19).
- Appearance of colorful areas on the upper fabric face of the color weft (a) appeared by blue color that is made of 12 wefts – end stain, also the lower fabric face of the color weft (c) appeared by brown color that is made of 12 warps – end stain, in addition to and the weft (b) is made as padding by using the shown figure no. (20).
- Appearance of colorful areas on the upper and lower fabric faces resulted of the mix color of warp and three wefts (a, b and c) (yellow, blue and brown colors) according to the figured textile structure of weft which is made on the twill base $\frac{1\,1\,5}{1\,2\,1}$ with its negative shape and shown in figure no (21).
- Appearance of colorful areas on the upper fabric face of the color weft (b) appeared by yellow color that is made of 12 wefts – end stain, also the lower fabric face of the color weft (a) appeared by blue color that is made of 12 warps – end stain, in addition to and the weft (c) is made as padding by using the shown figure no. (22).
- Appearance of colorful areas on the upper and lower fabric faces resulted of the mix color of warp and three wefts (a, b and c) (yellow, blue and brown colors) according to the figured textile structure of warp and shown in figure no (23).
- Appearance of colorful areas on the upper and lower fabric faces resulted of the mix color of warp and three wefts (a, b and c) (yellow, blue and brown colors) according to the graving dual structure and shown in figure no (24). So

the upper and lower fabric faces are made of 12 -End stain, also yarns ordered by (yarn for upper and yarn for lower face) and wefts ordered by (weft for upper and weft for lower)

- Appearance of colorful areas on the upper fabric face of the color weft (c) appeared by brown color that is made of 12 wefts – end stain, also the lower fabric face of the color weft (a) appeared by blue color that is made of 12 warps – end stain, in addition to and the weft (b) is made as padding by using the shown figure no. (25).
- We can obtain on designs have different colorful and technical visions on both fabric textile faces through the proposed textile interlaced methods (the aforesaid in research) by using warps have color order and wefts have color order.

The fifth experiment:-

Simulation model of the executed sample have been carried out by one of the most dedicated computer programs, using of seven different textile structures as shown in figures no's;(18),(19),(20),(21),(22),(23),(24) and(25) in this experiment. Also we used one color warp (black) and three wefts of color ordered (yellow: white: red), in addition to the figure (27 – a, b) shows the two photographs of face and back sample sides. The technical and colorful values of the two sample sides, including of colorful grading were achieved through the interaction between the textile interlaced methods and colors of (wefts & warp).

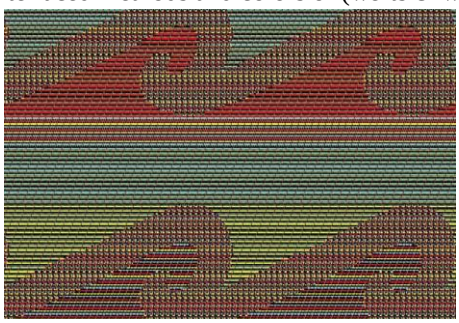
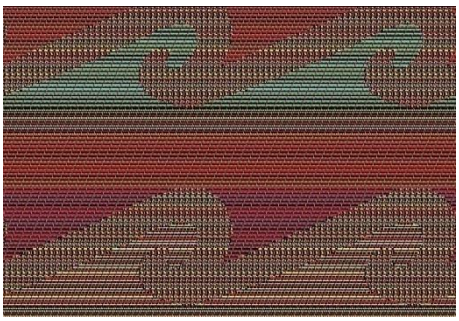

(b)

(b)

Figure (27 – a, b) Shows front and back faces of sample simulation photograph.

Evaluation of the research samples:-

A questionnaire about the research samples was applied to get a feedback from professionals to execute the implemented research samples. According to the survey analysis results, the research samples nos. (2, 3, 4) achieved positive results and a clear direction to achieve the goals of the research when compared to the sample (1), this is due to the compatibility of the used textile structures with the used applied description.

Table (7): Illustration to the questionnaire questions that has been applied: -

Questionnaire assessing research samples

Name (Optional).....

#	The question	Excellent	V.	Good	pass	Wea
1	The availability to achieve technical values of both sides of th sample.					
2	The sample availability to achieve new and creative vision.					
3	The fitting degree between the textile structure and aesthetics of design.					
4	The availability to use the two sides of the sample with the same efficiency.					
5	The availability of textile interlaced methods to achieve the research goal.					
6	The availability to achieve the objectives of the work by the used Materials					
7	The sample availability to achieve additional value of Jacquard looms.					
8	The availability to develop the textile industry by this sample.					

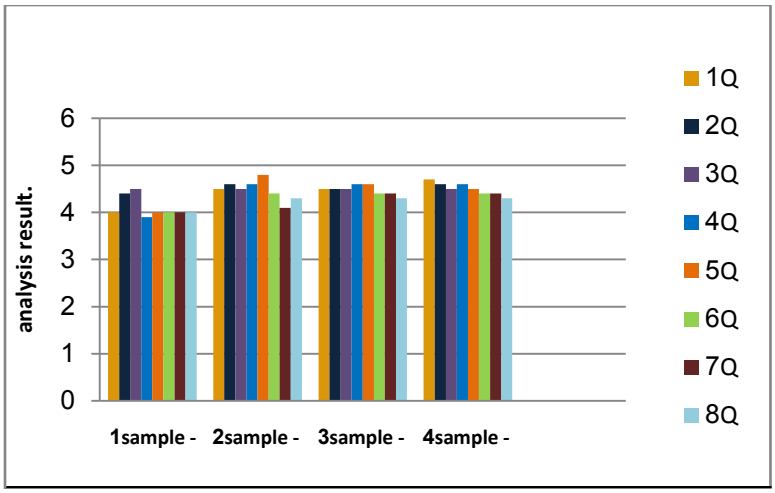


Figure (27): The next chart shows comparison between the research samples according to the questionnaire analysis result.

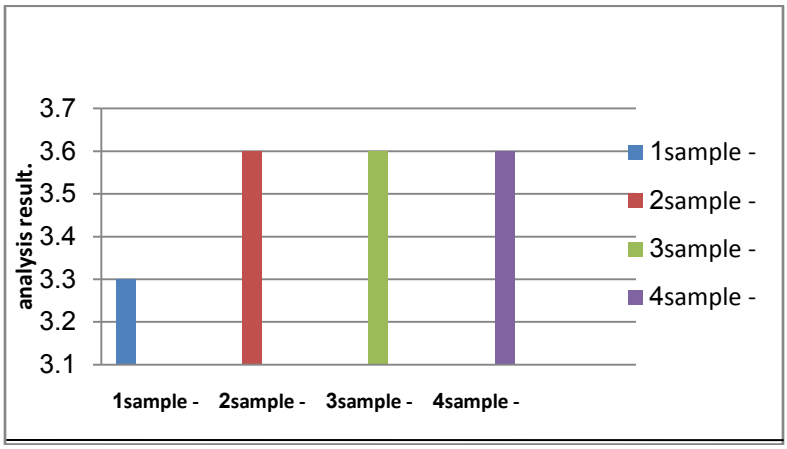


Figure (28): A graph showing the comparison between the research samples, according to the questionnaire analysis result

The study results:-

The data statistical analysis which was resulted from a questionnaire that was especially designed for this purpose showed that the produced fabrics had a lot of arbitrators' approvals, also met the study purpose. In addition to the technical and professional analysis of the produced textile & the questionnaire analysis, we could obtain on the below next results: -

- Obtaining on patterned fabrics has technical and aesthetic values of both sides.
- Producing patterned fabrics, we can employ them on the two sides with the same efficiency which was produced of: three wefts and one color warp for example (samples of three, five and six colors in addition to sample of eight colors of both the upper face and the lower face).
- Four designs producing of patterned double face (Some of these fabrics have a design face is similar to their back design and others their face design is not similar to their back design).
- Obtaining on the pile effect & the implication of a prominent and low-impact of the two fabrics sides.
- The samples (2, 3, and 4) achieved outstanding positive results towards research aims, comparing with the sample (1) according to the questionnaire results analysis.

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