DISCUSSION ON TEXTILES, FASHION, LEATHER AND TECHNOLOGY

CHESTITA NOVA GODINA!

HAPPY NEW YEAR!

1/2019
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Контакти/Contacts

e-mail: spisanie@tok-bg.org; redaktor@tok-bg.org; office@tok-bg.org
www.tok-bg.org

Редакторски съвет:
Проф. Елсайд Елнашар, Египет
Проф. д-р инж. Йован Степанович, Сърбия
Проф. д-р инж. Душан Трайкович, Сърбия
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Това е 1 брой от новата година на Онлайн списание за Текстил, облекло, кожи и технологии, който ще продължи да излиза всеки месец с традиционно представяне на събития, научно-приложими материали, доминиращи тенденции и прозрения в текстилната, модната и кожено-кожухарската индустрия от нашата страна и чужбина.

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The basis of the design of handmade chenille yarns and fabrics is similar to the other ways of designing velvety fabrics with the same effect as the woven fabric on paper. The boxes are of the same size that should be shown on the cloth. This is why a special type of square paper is usually used for this purpose. The weavers use handwork: a number of shuttles as much as the number of colors available. It is characterized by its cohesive strength in the places where the threads are woven, where we have sets of ribbons. One of the main objectives of the research is to devise a new method for the development of hand-made textile products and the purposes used in handmade chenille fabrics are decorative fabrics, ladies’ fabrics (evening cloths), pendants, curtains, Boudoir, Furnishing fabrics and carpets. The stages of the design and handmade chenille, 1) in the case of simple fabrics: a) weft in one color continuous, b) the use of stripes of the cross of the flesh, whether different colors of the chenille weft or the use of different materials with different Tex count and different specifications; First in the case of simple fabrics: in this type of design of the chenille of handmade simple and easy so as not to draw on the squared paper and the resulting effects are automatic and simple. And the formation and pile of the chenille (the process of the first weaving), which have their distinctive features. Second in the case of embossed fabrics. Handmade design of pile and chenille, formation chenille weft; the design of the chenille weave is designed so that the horizontal rows have the vertical position parallel to the warp threads to be woven, the second weaving process, the woven fabric structures of the cloth, handmade chenille according to the purpose for which the cloth is used. For example, tablecloths, curtains and pendants the production of one square meter of chenille carpets takes seven hours and is produced by one textile worker assisted by a youngster. The production of a meter of hand-made carpets takes at least seven days and is produced by a number of boys, ranging from three to five. This is in addition to saving about 25% of the wool used in the blaze with handmade chenille carpets in traditional carpets.

Keywords: Chenille Yarn, Chenille Tapestry, Original artworks

1. Introduction

Sustainability strategy of global brands in fashion marketing strategy is a key factor that most organizations in today’s society strive to achieve. The concept of strategy sustainability is about meeting the needs of the present without compromising the ability of future generations to meet their own for a long time [6]. Many yarns available in the market can be used for connections and circuit elements. These include silverized yarns [1]. However; Chenille yarn is fancy yarns as Join Beads are those produced with some deliberate discontinuity introduced either into the color or form of the chenille handmade tapestry with the intention of producing an enhanced aesthetic impression [8]. They determine the ornamentation in the chenille handmade tapestry. Chenille yarn is a kind of fancy yarn which is fascinating because of its gleam and...
softness [3]. It has a pile protruding all around at right angles and finds a wide range of applications including outerwear fabrics, home furnishing fabrics and knitwear [1]. Chenille yarns are constructed by twisting core yarns together in chenille yarn machines where pile yarns are inserted at right angles and cut to within 1 or 2 mm of the core yarn surface to create a surface in which the fibers contained in the pile chenille yarns burst and form a soft pile surface to the yarn [7]. The size and number of the pile chenille yarns and how many of them are fed onto the core determines the count of the yarn [7,9]. Chenille is a difficult handmade yarn to manufacture, requiring great care in production. Due to the nature of its pile loss; great care must be taken in converting chenille into final chenille handmade tapestry [4]. When the yarns are in use, clearly the of the chenille handmade yarn is crucially important, in particular because the handmade effect sought is always that of the velvety feel of the pile, and the bald look of worn velvet or handmade chenille is not appealing. Any removal of the effect yarn forming the beard, either during further processing or during the eventual end-use, will expose the ground yarns, which in turn will result in a bare appearance [6]. Despite the fact that chenille yarns are used to produce special chenille handmade tapestry with high added value, the literature survey shows that there is limited research on the design chenille handmade tapestry of Gauze and leno fabrics behavior of such chenille handmade yarns and chenille handmade fabrics.

2.1. Design of chenille

1-In the case of simple fabrics; A - Weft in one continuous color. B - The use of pens of the cross of the flesh, whether the different colors of the punch chenille or the use of the usual pads of different materials with different cartridges and different specifications.

2-in the case of embossed fabrics.

First in the case of simple fabrics: In this type of design, the design of the chenille is simple and easy not to draw on paper boxes and the resulting effects are automatic and simple, chenille wefts made from natural wool of Sheep collected and treated by primitive methods, from Matrouh Governorate in Egypt. Figure 1 (a) carding machine.

2. Experimental work

The design of the chenille handmade tapestry is similar to the other methods of designing the handmade tapestry where the color spaces are colored with the same effect as the woven fabric. As for the means used for the production of this type of cloth, it is necessary to take care more than those needed by the design of any kind of other fabrics structures; the design on the paper shows the squares of the same size as the ones shown on the cloth. This is why a special type of square paper is usually used for this purpose. The weaver uses a number of shuttles as much as the number of colors present. This velvety texture is characterized by its cohesive strength in the places where the threading threads are formed, where we have sets of ribbons. One of the most important uses of chenille handmade tapestry are decorative fabrics, ladies’ fabrics (evening cloths), pendants, curtains, Boudray, Furnishing fabrics and carpets.

2.2. Formation and Chenille Pil

As First weaving process, for chenille weave Gauze and leno fabrics, we use a number of decks as much as the number of automatic colors in place, as they change them manually or with one shuttle as a continuous color without overlapping other automatic colors, leaving only a small distance from the pads to allow the chenille to bend at the sides of
the cloth. In the event that a large number of chenille Weaving are woven next to each other in one. In this way, we can obtain any required space and weave the chenille on a simple loom of weaving fabric, with splicing, and distribution of threading on the loom by a moving system; interchangeable for two fixed yarns [2] each of these two threads is located in two consecutive sections of the reed. Each of these two threads strings separates from the adjacent groups a different distance depending on the length required for the pile. This range ranges from 1/5 to 5 cm for pile of the clothing, 2/5 inch for the small pile and 1 inch for the long pile if used for upholstery fabrics.

Figure 2 (a) at left chenille weft of Gauze and leno fabrics shows how the interlacing threads are arranged in the order of the wefts to the left of the figure of Gauze and leno fabrics, where we get an automatic multi wefts canvas or one continuous color woven fabric. In the formation of the chenille weft (the first weaving process), the use of filament yarns and the use of continuous filament, whether natural or artificial, are used to give new aesthetic values similar to furring. This texture is characterized by its cohesive strength in the places where the leno threads are in the figure (2).

After finishing the weaving of wefts chenille weaves, the cutting of these wefts is done halfway between the splicing threads as shown in Figure 2, where we have sets of strips.

2.3. Second weaving process

Fabric formation: This process is the final stage of the formation of chenille fabric, where the former weft chenille weave is used - used as one of the wefts of this fabric weaving. This weft passes through the width of the weave and is bonded to the surface of the base woven with fine yarn of cotton, flax or synthetic fibers and weaves the chenille in the cloth in the same normal way. However, the producers of this type of fabric in France come out of this frame in the way the traditional weft is transmitted and they have effects in the flow as if they were in tapestry or sumac, controlling the number of wefts/cm, the proportion of ratio openings and basic of fabric structures of the cloth using this method in women’s fabrics. In the international fashion trends for the 2018/2018 forecasting guide, seasonal of autumn-winter 2019 Promostyl guides Trend book with the use of fine and fine yarns for the yarn and weft.

3. Results

The chenille handmade of velvet fabrics are characterized by several aspects:
- Can be produced and pile cut off without the use of breeds conclusive as is the case in the Walton pile
- All materials forming the pile above the surface of the base cloth without any interference with it can be used an unlimited number of colors that appear each very accurately and clearly and the production of this type of fabric to the two processes; are completely separate from each other in the process of the first weaving, known as “weaving weft” interlacing piles yarns in the form of weft with groups of warp that are separated from each other by uniform distances in the weaving reed. This process of weaving follows the process of converting the resulting cloth into a number of long strips, which are known as pile chenille, which are used in the fabric process. The second is as a weft that interacts with a certain system to form pile on the surface of the basic fabric that is made up of the fabric.

3.1. Case of Embossed Fabrics

Design and design of chenille pile: The foundations of the design of the chenille are similar to

c) left chenille weft of Gauze and leno fabrics
d) right chenille weft of Gauze and leno fabrics

Figure 2. Left and right chenille weft of Gauze and leno fabrics
the other ways of designing the pile fabrics where the color spaces are colored with the same effect as the woven cloth. For the means used for the production of this type of cloth, it is necessary to take care more than what is needed by the design of any other types of pile fabrics. And drowning the design on the squared paper in the same size which is required to be shown on the cloth. This is why a special type of square paper is usually used for this purpose. Figure 3, Part of the design of chenille, where each vertical line of the squares of the two lofts used to form the chenille weft, while each horizontal row of squares in this design represents one weft of chenille weft. Each small square on the square paper represents two threads; pile in the colors shown in the design. The horizontal rows in the design are individual numbers on the right and even numbers on the left.

3.2 Composition of chenille weft

For chenille weave, the design is managed and the horizontal rows are combined with the vertical position parallel to the threading thread which will be woven on it. The weavers then weave each row of design rows on a starting line from the first sign at the bottom of the row, depending on the numbering of this row. The weavers use a number of shuttles as many colors as the design where he manually changes these shuttles. The weaver is the first to work with two weft for each horizontal square required by described color in Figure 2, Where the system of laying the various colors and colors shown by the design of this system until the end of the longitudinal row. Then leave a little distance from the padding without wefts to allow the chenille to bend at the sides of the chenille cloth and then start weaving the second row with the same system but in the opposite direction. The work continues in this order until the weaving of each row ends with repetition. The length of the chenille grain required to produce a design is equal to the length of the longitudinal row (which is originally a cross-section of the design) multiplied by the number of rows. For example, in the design of 150 different chenille wefts, each needing 224 double weft, Then (240x150x2) = 67200 Weft weave to produce the chenille weave required for the full design. However, a large number of chenille weaves are woven next to each other so that we can obtain any number of repetitive design requests. Moreover, in the case of designs with symmetrical patterns in the transverse direction, It is possible to only weave half of the required number of chenille wefts on simple handle loom with a spike is attached and the threading warp is distributed on this handle loom with a fast moving one thread movement system for two fixed steps. Each of these two threads is located in two consecutive sections of the reed gates. Each group of the two neighboring groups is separated by a different distance depending on the length of the pile that required. This distance ranges from 2/5 for the small pile and 1 inch for the long pile. Figure 2 shows how to thread threads in order of wefts to the left of the figure, and we get a multi-colored fabric with woven length. This texture is characterized by a strong cohesion and control the accuracy of colors in the places where the leno threads are attached, as shown in figure 2. After finishing the weaving of the chenille wefts, the cutting of these wefts in the middle of the distance between the twine threads as shown in Figure 2, where we have sets of strips each bar is a thread of chenille. Then the process of exposing these strips to the heat and steam and pressure to take these strips shape appropriate for easy then spun it as a sword in the final stage. Figure 4 shows the appearance of a tape after the completion of this process. The chenille weft is then taken and each bar is neatly wrapped and the appropriate number is taken into consideration for the next stage.

3.3 Second weaving process

This process is the final stage of the formation of chenille fabric, where the former chenille weave is used. It is used as one of the wefts of this woven material. As this weft passes by the width of the woven and is cohesive on the surface of the basic woven, by thin threads of cotton or linen. The length of the chenille is represented by the width of the woven fabric, representing the horizontal row of the design. The chenille weave is woven in the same way as regular wefts, but the loom stops after each chenille thread so that the weaver can be prepared in the right position to match the previous chenille weft in terms of color scheme and accuracy of design

3.3.1 Fabric structure for chenille clothes

The Fabric structure of the main fabric of the chenille fabrics varies according to the purpose for which the cloth is used - for example, tablecloths, curtains, hang artwork, etc. they are often lighter and more flexible in the basic construction than the carpet, which needs to be somewhat hardened. (A) In figure 4 Fabric structure as illustrated in (b).

In the same shape, the cross section of the weft, where two wefts are shown for each chenille weft, a warp ground thread opposite, with two fillers, one thread for consistency, and (consistency of chenille weft). Each nine warp threads that have a basic cloth as shown, also in (g-d) in fig. 5 Fabric structure and cross section of weft.

Where we find four wefts for each weft chenille a one thread ground, and two thin wefts for the cohesion and control the accuracy of colors of each of the eighteen warp threads of the original cloth,
Figure 3. Part of the design of chenille

and the two structures can be woven from nine yarns ground and eighteen yarns of fillers and three yarns cohesion. And control the accuracy of colors in one inch. While in the first example, 12 wefts and 6 chenille wefts, while the number of wefts per inch for the first example is 12 ground wefts and 6 chenille wefts. In the second example, the number of wefts per inch is 16 wefts of ground, 4 chenille wefts. The threading task is to tie the chenille fasten to the base cloth as shown in (b,d) in figures 4 and 5. Figure 6 illustrates another Fabric structure, which is woven by four wefts for ground for each one chenille weft. In this case, the threading thread is distributed in arrangement a single yarn ground and one yarn as filler is repeated three times, one flouted yarn and one fine yarn for cohesion and control the accuracy of colors.

Figure 5. Fabric structure and cross section of weft

4. Fabric structure of Gauze and leno fabrics

decorative fabrics and ladies' fabrics (evening fabrics), curtains, broueray, mattresses and carpets. Figure 7 illustrates a pattern of chenille weft for the production of chenille ornamental fabrics for ladies and chenille, which woven from cotton thread 40/2 for fixed warp, and 80/2 for movement.

The weft thread is woolen wool with a 20 Tex, with an average of 6 wefts per centimeter as traditional yarns extended by woven width. The cloth as shown is not yet ready for weaving in the second stage. Figure (8) shows a model of chenille weft after cutting and preparing it for weaving in the final stage. The warp of second stage is as follows: (Ground warp: 30/2, filling warp: 30/2, flouted warp: 40/2, feeding warp: 40/2). And each warp on an independent bobbin; Weft: Cotton 30/2 by with 6 wefts ground per centimeter.

Figure 6. Fabric structure and cross section of weft

Arrange two ground wefts for one weft chenille.

3.3.2. Denting system in weaving Reed

The first gate:(1 yarn for ground warp), (1 yarn for filling warp) :(1 yarn for flouted warp) :(1 yarn for Feeding warp )

The second gate):1 yarn for ground warp, (1 yarn for filling warp). This order is repeated.

Reed count: 4 gate per centimeter. The chenille
Fabrics are characterized by productivity of traditional hand-made fabrics with abundant production and rich colors. It has been scientifically proven that the production of one square meter of chenille carpets takes seven hours and is produced by one textile worker assisted by a boy, while we note that the production of a meter of handmade carpets manufactured in the traditional way takes at least seven days and is produced by a number of boys ranging between three and five according the wide of loom. This is in addition to saving about 25% of the wool used in the blaze with chenille carpets in traditional carpets. This art work was carried out in the style of the Chenille, I had gave him a gift to the College of Textile at the University of North Carolina in 2008.

Figure 7. Pattern of chenille weft for the production of chenille

Figure 8. A model of chenille weft after cutting and preparing it for weaving in the final stage

4. Discussion

In terms of the fiber fineness throw chenille handmade tapestry, for wool chenille yarns and fabrics, there is a tendency toward decreased mass loss with the use of coarser fibers. The mass loss of chenille yarns with chenille wool pile material was greater than that wool pile material. Similarly, Gauze and leno fabrics structures with these yarns showed the same softness behavior. These results can be interpreted as demonstrating that differences in fiber fineness will affect the pile density on the surface of the chenille yarn and chenille handmade tapestry. As the pile density of wool chenille yarn increases, the chenille yarn structure will be tighter, resulting in a more compact surface and increased degree of pile packing. The chenille piles will be held more tightly, which will raise the fiber cohesion and control the accuracy of colors. Thus chenille pile density affects the cohesion behavior of chenille yarns. Furthermore, it is stated in this work that increasing fiber diameter up to a limit improves abrasion resistance. when the mass loss results of wool chenille yarns and fabrics were compared with regard to yarn type, it can be seen that chenille yarns with conventional ring pile yarn component experience greater cohesion of original artworks reproduced of weave system by using gauze and leno fabrics structures throw and control the accuracy of colors than those with a mechanical/spun yarn component. The gauze and leno fabrics produced from those yarns also showed the same characteristic. This may be due to the fact that the resistance of chenille yarns and Gauze and leno fabrics to abrasive forces depend not only on the pile yarn fiber properties, but also on the pile yarn types and their positioning around the two core (axial) yarn components in the chenille yarn structure and Gauze and leno fabrics structures to create handmade of chenille yarn into digital chenille handmade tapestry to produce original artworks reproduced of weave system, Mechanical/spun yarn will more closely resemble a single yarn in structure.
but because of the low level of strand twist it has two important properties which improve its character to some extent: it is more abrasion resistant and less hairy. A similar differentiation resulted in the mass losses of Gauze and leno fabrics from chenille yarns. Accordingly, we can postulate that when polyester fiber material exists in the pile yarn the cohesion and control the accuracy of colors characteristics of wool polyester chenille yarns and fabrics do not show a different tendency from those of wool-type yarns and fabrics. Chenille yarns with a conventional ring pile yarn component are abraded more than the yarns with a Mechanical/spun yarn component. The effect of yarn type on the cohesion behavior and control the accuracy of colors was similar for the fabrics Gauze and leno fabrics with wool-polyester chenille yarns.

5. Conclusion

In this study, Gauze and leno fabrics structures throw the cohesion behavior and control the accuracy of colors of wool and primitive wool blended chenille yarns was analyzed with a computerized image analysis method. In addition to image analysis, yarn and fabric cohesion tests and control the accuracy of colors were also carried out to assess cohesion resistance and control the accuracy of colors and to determine the relationship between the mass loss values and values obtained from image analysis. The influence of Gauze and leno fabrics structures on some parameters of chenille yarns and chenille fabrics on yarn cohesion and control the accuracy of colors, fabric cohesion and control the accuracy of colors and cohesion and control the accuracy of colors coefficient values obtained from image analysis was investigated. We have shown that pile yarn material handmade of chenille yarn into digital chenille handmade tapestry and pile yarn fiber fineness, as well as pile yarn type have significant influences on the cohesion resistance and control the accuracy of colors and the serviceability of wool and wool-blend chenille yarns and fabrics in accordance with past findings. Pile loss is encouraged by inadequate fiber adherence. Gauze and leno fabrics structures careful choice of the pile and core yarns to increase the inter-fiber friction may assist in reducing the rate of pile loss. Results imply that using primitive wool fiber in the blends, wool fibers with appropriate fineness and mechanical/spun yarn type in the production will help to produce chenille yarns with high cohesion resistance and control the accuracy of colors. Chenille yarns and chenille fabrics of Gauze and leno fabrics structures with high pile density are abraded less than those with low pile density. Using primitive wool fibers with appropriate fineness is intended mainly to assist in avoiding the slippage of the piles from the lock yarns. In order to find the practical plane of comparison for values obtained by gauze and leno fabrics structures of the three kinds of cohesion measurements and control the accuracy of colors, linear correlation coefficients were calculated. An assessment of the abrasive behavior of chenille yarns and fabrics in terms of possible to predict the fabric cohesion performance and control the accuracy of colors of chenille handmade tapestry. So it will be a practical method and enable a rapid laboratory interpretation. Furthermore, it will be useful to carry out studies about the effect of pile of chenille yarn fiber fineness, pile chenille yarn type and fiber material on the dimensional and physical properties of chenille yarns and chenille fabric of gauze and leno fabrics structures, which is beyond the scope of this study and should be the subject matter of future studies.

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6. References

The main objective of the study is to develop the algorithms to assess by criteria the harmony of the typological ranges of cutting lines in clothes. In order to develop the algorithms models of the analytical description of the restrictions in the modification process of the designing object were described. The developed algorithms are as follows: algorithm to specify the anthropometric information in the system of projection dimensions of harmonious female body; algorithm to classify the typical bodies by the indices of deviation in the net of harmonious cutting lines; algorithm to transform the general sketch of harmonious female body into the given body type; algorithm to design the universal construction for the transformation chain of typological range of designing object; algorithm to modify the horizontal projection cutting lines into curve lines of the garment; algorithm to define the designing object; algorithm to form the production model of the knowledge base of expert system.

Keywords: algorithm, harmonious, clothes, typological range.
modelling of the subject area of the expert system is devoted to application of the particular elements of the fundamental mathematical apparatus of Petri nets [3].

The concept of typological ranges is used in areas of literature, architecture, philology, archeology, anthropology, and many others [4]. Oscar Montelius gave the description of the typological range as follows: the series is typological if its objects are functionally definite things, which are the things of the same category. The range shows gradual changes of the form during the time going [5].

It is advisable to arrange the figure types in the form of the typological range that is designed on extension principle of typical graphs based on the lubricating of the development level of body anatomic belts. This range highlights differences between the separate body types as well as interrelationships between them.

While typological analysis is conducted the complex objects (in the given circumstances women figures) are to be presented with samples of typical figures. Thus, description of a body type is the typical figure that is characterized with typical set of morphologic features. As morphologic features to recreate the figure’s outline, projection body measurements on the front and side images of the figure are used more and more often [6-9].

Conditions those describe the ability to inherit the morphologic parameters might be described by the multicriterial analysis of the object set. It is based on the calculation of the Euclidean distance that is considered as a measure of the objects similarity [10]. A measure of aesthetic, which is a universal characteristic of the clothing harmony, is considered from the point of view of information theory as “an order in complexity” in form of the integral assess of the order [11].

Algorithms of inheritance of morphologic features of typical figure are recreated in the last version of the pattern design system “Grazia” (module “Individual and corporate orders”) [12]. However, in the module the criteria of harmonious figures are not taken into account.

MODELS OF ANALYTICAL DESCRIPTION OF RESTRICTIONS IN THE MODIFICATION PROCESS OF DESIGNING OBJECT

Results of the harmonization technique, which is used to harmonize design and composition decisions of garments, might be assessed by experts, who assess quality indexes, as well as with help of some abstract criteria.

Eysenck’s concept formula of aesthetic measure [13] is as follows:

\[ M = C \cdot O, \]  

where C – complexity;

O – orderliness.

Measure of the proportion system is a measure of the dimensional orderliness of the clothing dimension structure.

Informational properties of the proportion’s relations are described by formula:

\[ p^s = \frac{1}{s^2} \]  

where \( p \) – a base of the proportion series; \( s = 1, 2, 3... \) – indicators of the degree that characterizes the relative position of its members.

A key measure in information theory is the amount of uncertainty that is called “entropy”. It is calculated as follows [14]:

\[ H = -\sum_{i=1}^{n} p_i \log_2 p_i. \]

where \( p_i \) – probability of presence in the system of \( i^{th} \) element of its alphabet.

It is advisable to include into the alphabet of the typological range’s harmony follows elements:

a) elements that form the main properties of the game field of designing system “body-clothing”;

b) elements that form complexes, which are the functional and structural features of body type;

c) elements that change a length of transformational chain if they are not universal;

d) elements that determine aesthetic expression of clothing;

e) elements of the clothing design.

The algorithm to assess the harmonization parameters of the system “Clothing” by criteria includes four blocks of data provided for the given typological range. Based on the information model of integrated database of designing process of harmonious clothing it was proposed to use a system of assessment, which takes into account parallel ways of forming the local databases. Among them are features of the morphological structure, fabric properties, cutting lines of a form, and a construction.

Concept modelling of the information support of
harmonization process of clothing demands technical description that is based on a semantic network. Nods of the semantic net are blocks those realize interactive or calculative actions, and edges are the results of the blocks functioning.

A view of determined semantic net, which displays solving processes of tasks system to form the typological series, is shown on the example of harmonized objects (fig. 1). The nods of net $B_{i} (i=1,..)$ are related to modules those perform action blocks of the following purposes:

1. specify the anthropometric information in the system of projection dimensions of harmonious female body;
2. classify the typical bodies by the indices of deviation in the net of harmonious cutting lines;
3. define the designing object;
4. transform the general sketch of harmonious female body into the given body type;
5. form the production model of the knowledge base of expert system;
6. design the universal construction for the transformation chain of typological range of designing object.

Modelling the expert knowledge about harmonization processes of the objects, which belong to the system “Clothing”, demands that the processes to be presented in unambiguous and optimal form of datasets, algorithms, and software programs.

![Fig. 1. Semantic net, which displays solving processes of tasks system to form the typological series of design objects](image)

**Algorithm to specify the anthropometric information in the system of projection dimensions of harmonious female body**

A module to determine analytical criteria to assess the results of modifications in subsystem «figure» includes a set of modules, general structure of which is of the same type. The modules are as follows: a module of technical sketch of conditional harmonious figure; a module of harmonized figure types and their parameters; a module of identification of the typical figures, which are similar to harmonious. The principle basis of the proposed assessments are the selection methods in the study of the morphological constitution of the body and its basic coordinates such as bones, muscles and fat. The coordinates objectively reflect geometry of a body surface and they might be compared by using the specific scale with projection dimensions of body in order to construct a graph model of harmonious typical figure.

Not all of the typical women figures, body measurements of which are mentioned in regulatory documents, are harmonious [15-17]. If their measurements differ from the harmonious ones more than limit of visual perception tolerates, then their forms must be corrected. Group of harmonious figures includes the figures, which meet the canon proportions of women bodies. In order to represent the measurements of the harmonious figure, which is built on the rule of “golden ratio” and chosen as an etalon, the system of conditional units was developed based on numbers of the Fibonacci series [18] (fig. 2).

![Fig. 2. Module of the technical sketch of the nominal harmonious figure of a woman](image)

In order to select out the typical figures, which match to harmonious proportions, according to the equation 2 the factor of proportion was proposed. It must be calculated as follows:

$$K_{pr} = P/76$$  \( (4) \)

where $K_{pr}$ – proportionality constant between heights of typical figure and nominal harmonious figure;

$P$ – height of a typical harmonious figure, cm;

76 – height of the nominal harmonious figure.

Typical figures match harmonious figures’ proportions if they have projection body measurements, which differ no more than 3% from the measurements of etalon harmonious figure (table 1).

A set of 257 typical figures, which are presented in [19, 20] was examined using the coefficient of deviation. Among them are 97 figures with height 152 cm, 98 figures with height 164 cm, and 62 figures with height 176 cm. The coefficient of deviation was
calculated by following formula:

$$k = \left( \frac{T}{T_h} - 1 \right) \cdot d_h$$

(5)

where $k$ – coefficient of deviation;
$T$ – body measurement of typical figure, cm;
$T_h$ – body measurement of harmonious figure, conditional units.

Main horizontal projection measurements of a body were selected out to calculate the differences (fig. 3, table 2).

Using the calculated coefficients of deviation intervals between sizes were calculated for the body shapes with chest circumference 80…132 cm (bust) and body shapes groups defined by Hip-Chest circumferences. Shapes codes by Hip-Chest circumferences are as follows: -III, -II, -I, 0, I, II, III, IV, V, VI, VII.

Different body development degrees on bust, waist, and hips level in two projections are determined taking into account obtained ranges of deviations (table 3). Degrees of development of morphological feature are characterized by following indexes Small – S, Medium – M, Large – L, Extra Large – XL, Extra-Extra Large – 2XL, Extra-Extra-Extra Large – 3XL.

Characteristic of deviations of projection measurements allows realizing an algorithm to classify the typical bodies by the indices of deviation in the net of harmonious cutting lines. It is performed by combination of degrees of development of morphological features.

Such combination specifies forming front and profile body type. Analysis of the variants of development of morphological features along with their combination principle allowed developing the classification that includes 26 types (table 4).

A body type is marked as follows: the first letter marks a degree of body development on the bust level; the second – on the waistline; and the third one – on the hips level.

The set of considered figures is divided into the five groups based on the principle of the visual similarity (table 4).

The optimal combination of the fraction of chaos and orderliness of the typological series describes the relative entropy of the golden section rule. The relative entropy is 0.382. Then the fraction of orderliness is about 0.618 if the typological range is harmonious.

A special case of Hamilton’s principle is a principle of minimax, which is based on Euclidean distance calculation [10] between the new type and types of the typological range.
Table 3. Characteristic of deviations of projection measurements of women figures (fragment)

<table>
<thead>
<tr>
<th>Height, cm</th>
<th>Projection measurements (front), conditional units</th>
<th>Projection measurements (profile), conditional units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$d_1$, $d_2$, $d_3$, $d_4$, $d_5$, $d_6$</td>
<td>$d_1$, $d_2$, $d_3$, $d_4$, $d_5$, $d_6$</td>
</tr>
<tr>
<td>152</td>
<td>-2.055 -0.274 -1.47 -0.105 -1.764 -0.441</td>
<td>-3.993 -2.42 -2.052 -0.304 -3.15 -0.63</td>
</tr>
<tr>
<td>164</td>
<td>-3.155 -1.235 -1.785 -0.42 -1.911 -0.588</td>
<td>-4.84 -2.783 -2.964 -0.912 -3.15 -0.945</td>
</tr>
<tr>
<td>176</td>
<td>-2.055 -0.411 -1.575 -0.315 -1.47 -0.147</td>
<td>-3.993 -2.299 -1.444 -0.228 -1.89 0.315</td>
</tr>
<tr>
<td>152</td>
<td>-0.274 1.507 -0.105 1.26 -0.441 0.882</td>
<td>-2.42 -0.847 -0.304 1.444 -0.63 1.89</td>
</tr>
<tr>
<td>164</td>
<td>-1.235 0.685 -0.42 0.945 -0.588 0.735</td>
<td>-2.783 -0.726 -0.912 1.14 -0.945 1.26</td>
</tr>
<tr>
<td>176</td>
<td>-0.411 1.233 -0.315 0.945 -0.147 1.176</td>
<td>-2.299 -0.605 0.228 1.90 0.315 2.52</td>
</tr>
<tr>
<td>152</td>
<td>1.507 3.288 1.260 2.625 0.882 2.205</td>
<td>-0.847 0.726 1.444 3.192 1.890 4.410</td>
</tr>
<tr>
<td>164</td>
<td>0.685 2.603 0.945 2.310 0.735 2.058</td>
<td>-0.726 1.331 1.140 3.192 1.260 3.465</td>
</tr>
<tr>
<td>176</td>
<td>1.233 2.877 0.945 2.050 1.176 2.499</td>
<td>-0.605 1.089 1.900 3.572 2.520 4.725</td>
</tr>
<tr>
<td>152</td>
<td>3.288 5.069 2.625 4.095 2.205 3.675</td>
<td>0.726 2.299 3.192 5.092 4.103 7.035</td>
</tr>
</tbody>
</table>

A set $X$ of figures types is presented as follows:

$$X = (F_1, F_2, F_3, F_4, F_5, F_6),$$

where $F_1$, $F_2$, $F_3$, – front projection measurements, conditional units; $F_4$, $F_5$, $F_6$ – profiles projection measurements, conditional units.

A measure of the objects similarity is the Euclidean distance $\rho(X_p, X_q)$ that is calculated as follows:

$$\rho(X_p, X_q) = \sqrt{\Delta d_1^2 + \Delta d_2^2 + \Delta d_3^2 + \Delta d_4^2 + \Delta d_5^2 + \Delta d_6^2},$$

where $X_p$ – typical figure; $X_q$ – harmonious figure; $\Delta d_1$, $\Delta d_2$, $\Delta d_3$, $\Delta d_4$, $\Delta d_5$, $\Delta d_6$ – absolute deviations of projection body measurements, conditional units (see table 4).

ALGORITHM TO TRANSFORM THE GENERAL SKETCH OF HARMONIOUS FEMALE BODY INTO THE GIVEN BODY TYPE

Eleven steps form a transformation technique that is used to transform a technical sketch of the harmonious figure into the technical sketch of the typical one (fig. 4):

Step 1. Applicate the boundaries of anthropomorphic belts to the frontal and profile projections and draw the axis of symmetry on the frontal projection (fig. 4, a).

Step 2. Copy the left part of a figure and left hand on the frontal projection.

Step 3. Copy the whole figure and right hand on the profile projection.

Step 4. Increase or decrease the width of the figure’s sections and the segments of the upper limbs in a horizontal direction (fig. 4, b).

Step 5. Increase or decrease the length of the figure’s sections and the segments of the upper limbs in a vertical direction.

Step 6. Construct auxiliary mesh to correct the body shape on the profile projection (fig. 4, c).

Step 7. Correct the mutual location of the
Table 4. Characteristic of the groups of typical female body shapes

<table>
<thead>
<tr>
<th>Body shape group</th>
<th>Top hourglass</th>
<th>Inverted triangle</th>
<th>Rectangle</th>
<th>Spoon</th>
<th>Bottom hourglass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skinny</td>
<td>S-S</td>
<td>S-S</td>
<td>S-S</td>
<td>S-M</td>
<td>S-M</td>
</tr>
<tr>
<td>Normal</td>
<td>M-M</td>
<td>M-M</td>
<td>M-M-M</td>
<td>M-L-M</td>
<td>M-L-L</td>
</tr>
<tr>
<td>Wide</td>
<td>XL-L-L</td>
<td>XL-L-XL</td>
<td>XL-XL</td>
<td>XL-XL</td>
<td>XL-XL-XL</td>
</tr>
<tr>
<td>Massive</td>
<td>3XL-2XL-2XL</td>
<td>3XL-2XL-3XL</td>
<td>3XL-3XL-XL</td>
<td>3XL-3XL-XL</td>
<td>3XL-3XL-XL</td>
</tr>
</tbody>
</table>

Anthropometric parts of a figure and the segments of limbs on the profile projection (fig. 4, d).

Step 8. Correct the figure’s contours by constructing smooth lines in the places of anthropomorphic belts’ transition.

Step 9. Joint the upper limb with the figure on the profile projection and the left hand with the left half of the figure on the frontal projection.

Step 10. Mirror reflection of the right side of a figure on the front projection.

Step 11. Correct the body form on the levels of shoulder blades, buttocks and chest (profile projection of a figure) [21].

It is advisable to use AutoCAD in order to apply the algorithm of transformation.

ALGORITHM TO FORM THE PRODUCTION MODEL OF THE KNOWLEDGE BASE OF EXPERT SYSTEM

Complex “Rapana” includes two components: “Cognitograph” (software for the developers of knowledge base of the expert system) and “Expert” (application for users). Using “Expert” does not require special training, because dialogue is conducted by natural language.

Seven entities are entered into the shell. The figures for these entities are determined by the consumer in the form of answers to the questions of the system: SA, BS, CS, TN, FM, TdTu and 1c (colour). For making a decision two entities are necessary, their figures are determined immediately by expert system regulations: Cl (cluster) and M (model). Example of dialogues of the developed expert system, which represent consumer’s answers to the system’s questions and explanations of dialogue results are shown in [22]. Letter marks mean the codes of entities included in the regulations; digital designations are the numbers of rules used by the expert system to get answers to user’s questions.

ALGORITHM TO DESIGN THE UNIVERSAL CONSTRUCTION FOR THE TRANSFORMATION CHAIN OF TYPOLOGICAL RANGE OF DESIGNING OBJECT

Main features of the game space are the basis of the algorithm to design the typological range of objects, which belong to the system «body→clothing» and are designed by module technique. The main features are as follows: limitation, structurality, ceaselessness, uniformity, achirality.

Limitation is achieved by operational apparatus of affine transformation those are defined by intervals of deviations (table 3).
Structurality is presented by functional block of alterations in the transformational net of typological range (fig. 4).

Ceaselessness is based on calculation of Euclidian distance between typical and harmonious figures of the typological range (formula 7).

Ability to combine is limited by rules of proportion types to determine psychological comfort of a person.

Uniformity of the game space is described with help of algorithm of universality of the consumer’s “Self concept” that is related with the system “Costume” using triad of transformation described by [23] (fig. 4).

Achirality of the psychology of objects perception is proved by unequal uniformity of mirror alterations perception (fig. 5) [24]:

Ideal self – harmonious figure;
Mirror self – harmonious typical figure;
Mirror appearance – ideal costume.

Results of alterations, which are performed using the proposed algorithm, are clothing models those are aesthetic and harmonious. Alterations number is limited by criteria of psychological comfort, which ought to be about 0,62 < rS ≤ 0,79.

CONCLUSION

Analytical models of the criterial assessment of harmonization parameters of the system “Clothing” were proposed. Concept modelling of information support of harmonization process grounds on the alphabet of elements, which describe harmony of the typological range of aesthetic measure of design solutions of clothing.

The algorithm to determine a harmonious figure type was developed based on Euclidian distance calculation. The deviations of projection body measurements were input data to calculate the Euclidean distance.

The algorithm of the game space to design the typological range of the system “body-clothing” was described with taking into account psychological perception of consumers.

Expert system that was developed in the empty shell “Rapana” allows reflecting the consumer’s perception of his “Mirror self” while garment is designed.

Described technique might be used in design processes such as clothing design, where aesthetic criteria are greatly concerned.

REFERENCE


[18]. OST 17-326-81 Products are sewing, knitted, fur. Typical figures of women. Dimensional signs for the design of clothing. Moscow, TsNIITEIlegprom, 1981.


Online magazine for Textiles, Clothing, Leather and Technology -ISSN 2535-0447. The magazine inform, reflect and promote Bulgarian and foreign specialists, their research, studies, reports, etc. The site and magazine will present the upcoming exhibitions, fairs, conferences, workshops, seminars, participation in competitions, fashion shows and trends, business models, as well as other events in the field of Textiles, Clothing, Leather and Technology.

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In 2019 the goal of the OEKO-TEX® Association is again to reinforce consumer protection and sustainability along the value creation chain for textiles and leather; the existing guidelines for the OEKO-TEX® product portfolio have thus been amended again for the start of the year. The new regulations will come into effect after a three-month transition period on 1 April 2019.

Overview of some important changes:

- OEKO-TEX® already complies with the new “REACH Annex XVII CMR Legislation”

- The substance benzene and four amine salts have been included in the STANDARD 100 by OEKO-TEX® and LEATHER STANDARD by OEKO-TEX® and limit values have been defined. The substance quinoline, which has been under observation by OEKO-TEX® since 2018, is now also regulated with a limit value.

- In the course of “standardisation” of the limit value requirements, the requirement “<” now applies for almost all limit values.

For over 25 years, the OEKO-TEX®’s strategy has not been to wait for legislation but to be proactive in the field of consumer protection as a pioneer. As a result of the implementation of the above-mentioned updates, the STANDARD 100 and LEATHER STANDARD already comply with the requirements of the new “REACH Annex XVII CMR Legislation” (Commission Regulation (EU) 2018/1513). In contrast, this legislation addressing 33 CMR substances will only be applied for products from 1 November 2020 on. Thus, OEKO-TEX® is way ahead and also covers many other parameters related to consumer protection.

Further new additions to the limit value catalogues

New to the limit value catalogues are various Substances of Very High Concern: these are the siloxanes D4, D5 and D6 as well as diazene-1,2-dicarboxamide (ADCA). Furthermore, a requirement has now been made with regard to the extractable part of the metals barium and selenium.

In Annex 6 of the STANDARD 100 by OEKO-TEX®, limit values have been made stricter for various parameters. This relates to the parameters for phthalates (softeners), alkylphenols and alkylphenol ethoxylates as well as for per- and polyfluorinated compounds. The even more stringent requirements for residues in textile materials will result in an overall lower impact on the environment, workers and consumers.

Glyphosate under observation

In 2019 two new product groups will be under observation: glyphosate and its salts as well as the carcinogenic N-nitrosamines and N-nitrosatable substances.

Glyphosate products in particular, currently the quantitatively most important ingredient in herbicides, received a lot of media attention during 2017 and 2018 and were the subject of fierce controversial debates around the world. At the end of 2017, approval for glyphosate and for further use was only temporarily extended by the EU to five years – under protest from different consumer groups and environmentalists. With the “Under observation” action, the OEKO-TEX® Association is now looking more closely at the substance group in relevant textile materials and is analysing the situation in more detail.

Expanded product portfolio for sustainable production conditions

The STeP assessment will be extended to leather production facilities in 2019. The name will also be changed in the course of this integration: “Sustainable Textile Production” will become “Sustainable Textile and Leather Production” – the product name STeP remains the same.

For more info: www.oeko-tex.com
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PARADISE FOUND
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ACTIVISM
In today’s technology driven environment, we long for sensory stimulation. Technology helps us explore new worlds, giving us a taste of paradise. In this new Garden of Eden, fashion offers digitally inspired, sensitive, sensual, wearable garments. Swimwear entertains, evokes escapism, and reveals digitally generated patterns alongside shades blurring boundaries between real and illusory. Data-inspired patterns are simultaneously dynamic, energetic and glamorous.

DECO LUX
Opulence personified. Bursting with provenance while addressing desire for decorative, meaningful beauty and elegance. Swimwear on a mission to raise awareness and appreciation of historic art movements and painstaking craft techniques. Inspired by Art Deco, a 1920s decorative arts and architecture movement, this theme sees swim fashion express a desire for exclusivity, exuberance and masterly expertise.

ICONIC
Normality and longevity outdo fast fashion looks and instead call for archetypal, iconic maritime themes. Real, honest and straightforward aesthetics dominate the search for the perfect swimsuit. Classic favourites are improved, popular basics upgraded and new efforts put into optimum comfort, durable fit and streamlined silhouettes for a bespoke look. A slight vintage spirit and a 1950s freshness translates into a fresh and bold design with new performance features.
INTIMATE APPAREL
SANCTUARY
With our hyperconnected, distracted lifestyles, we search for the quiet, contemplation and self-actualisation. Yoga, dance and meditation have increasing appeal. For intimate apparel, this means reassessing values, pursuing a subtle, essential aesthetic, stripping back decoration and complication to reveal calm design in a sensitive colour and material palette.

BLOOM
Flowers trigger emotions and generate that sense of connection we yearn for. Their perpetual romance manifests itself in contemporary intimate fashion, addressing the desire for beauty, embellishment and self-adornment. There is a need for timeless charm and patterns with longevity, with a touch of antiquity in a contemporary translation. Blooms touch the soul and heart. Traditional florals stay classic and true to their original form, but can also be reimagined to gain new relevance.

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Monika.Blume <blume@ejkgermany.de>
Gudrun.Tegge <tegge@ejkgermany.de>
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