USE OF NON-TRADITIONAL METHODS OF CONSTRUCTING GARMENTS WITH THREE-DIMENSIONAL ELEMENTS

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Abstract: *This work introduces the theoretical aspects of the use of non-traditional elements of constructing garments. The heuristic methods apply in the cases when the traditional methods of resolving the constructive modeling problems are incapable to overcome the complexity of shapes. There is a multitude of methods and principles of designing and modeling garments that may generate ideas based on the individual creativity, logical development, thus capable of intensifying the creative exploration process. The experimental researches have addressed the possibilities of providing cohesion between the architecture and the design of garments by using the materials and spaces, without being limited to the shape of human body. This imposed the use of architectural reconstruction technique, based on a mosaic concept. Another technique fitting in the mentioned concept is the "Origami", allowing to obtain plane shapes. The change of volume and structure of product elements was enabled owing to the three-dimensional multiplication technique named "Accordion".*

Keywords: *complex shapes, three-dimensional elements, design of garments.*

1 INTRODUCTION

The shape is a complex spatial structure composed of surfaces and volumes organized in a totality representing the main tool providing for the diversity of the external appearance of garments.

The actual technology of manufacturing garments with plane components, cut of various materials, following the processing and assembly of parts allows to present them non-linear spatial elements in the products. This is characterized by a wide diversity of shapes and dimensions that may be varied depending on the dimensions and shape of human body, type and destination of product, imposed requirements, properties of materials, etc.

The surface of shapes depends on the presence of constructive, constructive-decorative, functional-decorative and decorative elements. Depending on these, the surfaces maz be smooth or complex, named also as spatial character shapes.

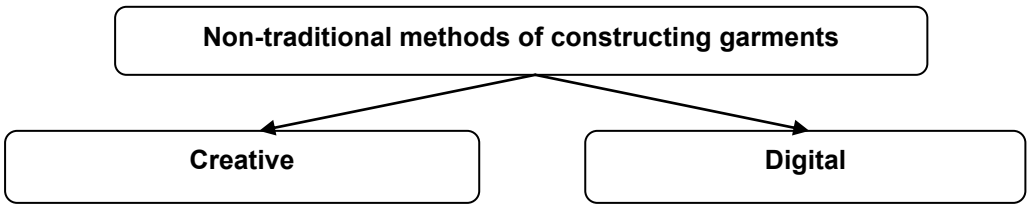
The human body is referred to the category of complex shapes. Therefore, in order to obtain a spatial form the product must be divided into components. In these conditions the obtaining of adequate plane projections of shapes becomes an important problem of constructing garments, as well as the additional processing of reference points and elements on particular areas. The shape of garments is assured by the presence of justified reference points differentiated depending on the functions they perform in the main, auxiliary and decorative elements.

The product shape is affected not only by the model and its construction, but also by the characteristics of constituent materials: structure of textile fabric, draping, folding fabric, deformation degree, thermal plasticity degree.

2 THEORETIC ASPECTS OF USING NON-TRADITIONAL METHODS OF CONSTRUCTING GARMENTS

The problems of constructive modeling of garments, as a rule, a resolved by the use of traditional methods, and in the cases when they impose limitations, it is recommended to apply the heuristic methods aimed at initiating and intensifying creative thinking.

The creative process is an extremely complex phenomenon offering unrepeatable results owed to the overcoming of psychological inertia. The heuristic methods represent a set of algorithm-based procedures used in the creative practice on a large scale and providing for unexpected and original results.
The non-traditional methods of constructing garments are divided into creative and digital methods (scheme 1).



Scheme 1: Classification of non-traditional methods of constructing garments

The ***creative methods*** are divided into five groups:

I. Methods of re-approaching design problems:
I.1 Formulation of analogical problems;
I.2 Reformulation of problems;
I.3 Formulation of additional questions;
I.4 Deficiency series;
I.5 Free expression of functions.

II. Design methods:
II.1 Combinatory method;
II.2 Deconstruction methods;
II.3 Modular method.

III. Methods providing for new paradoxical solutions:
III.1 Inversion;
III.2 Empathy;
III.3 "Brainstorming";
III.4 "Brain besiege";
III.5 "Meeting of pirates";
III.6 Delphi;
III.7 Caricatures.

IV. Analytical methods:
IV.1 The seven searching times: Who? What? Where? With what? Why? How? When?;
IV.2 Construction of matrices and networks;
IV.3 Generation of ideas by diagrams

V. Methods based on professional games:
V.1 Scripting – writing scenarios;
V.2 Simulation games.

These methods are successfully used in the avant-garde fashion. The generate elements that were initially referred to grotesque and absurd ones but later accepted as rational.

The creation process may not be deprived of inspiration sources, such as natural phenomena, social events, objects of reality in the surrounding environment, etc. The designer is always in the search for new shapes, modalities of conjugating volumes and various combinations of constructive elements. Therefore, the fashion comprises a continuous series of experiments initiated by the most prestigious creators of images who are known to the wide public allover the world and after some time they become banal. The fashion operates as a three-stroke engine: invention, spreading, preemption.

3 TECHNIQUES USED IN THE DESIGN OF PRODUCTS WITH THREE-DIMENSIONAL ELEMENTS

The experimental studies considered the application of various spatial modeling techniques in the view of elaboration of new models of garments. At the stage of initial design common for all techniques one has to obtain the initial pure shape of the product based on the shaping elements present in the initial construction of the product. The modeling process begins with the tracing of styling lines directly on the product body. These lines are drawn in accordance with the creator's idea, compulsorily they must pass via the prominent points of human body. The presence of styling lines on the product body allows to create original and irrepeatable models. The results of application of the following techniques are considered in this work:

1. **The "Architectural" technique** – implies the integration of an architectural or geometric construction into the product structure without affecting the comfort of the initial product. The main problem in this case is the modality of eliminating the seams and providing the adherence of elements of architectural construction within the product. The following stages must be passed – through in order to obtain the three-dimensional effect:
   - **1.1)** The location place and the dimensions of the architectural block are marked on the product element bearing in mind the fact that it has to pass through the prominence points ;
   - **1.2)** The projection of a three-dimensional element is constructed so as to enable its generation based on simple or complex geometrical shapes;
   - **1.3)** The architectural block is applied on the product element and affixed with adhesive tape without distorting the initial shape of the main reference points;
   - **1.4)** Styling lines are traced in order to integrate the architectural geometric block into the initial shape of the reference point, passing through the prominence points;
   - **1.5)** The resulting construction is detached and flattened in accordance with the styling lines;
   - **1.6)** The model is reconstructed by the assembly of reference elements, special attention being paid to the combination of margins of architectural elements.

The „Architectural" technique may be applied to any element of the garments, both with shoulder support and with waist support. These elements confer additional originality that may be developed by various modalities of tracing styling lines, as well as by the use of materials of various colours. The complex architectural elements provide for the possibility to diversify the external appearance of products by chaning the position of particular components of the geometric element.

Figure 1: Use of „Architectural" technique on the façade of product

2. **The „Origami" technique** originates from the Japanese paper folding art. In order to obtain various folded shapes one may use the internal or external folding procedures. The three-dimensional shapes originate from the plane surface of fabric, similarly to the paper applications. In order to obtain the „Origami" effect, the following staged must be passed-through:
   - **2.1)** Marking of the location place of the three-dimensional element on the product's reference point, following the position of the prominence points;
   - **2.2)** Tracing of transformation styling lines taking over the constructive role of main cuts;
   - **2.3)** The element of product is dismembered following the styling lines;
   - **2.4)** Folded paper bands are inserted so as to form folded margins of three-dimensional element. The width of these bands must be at least 5–6 cm in depth, so as to provide for the rigidity and resistance of shape;
   - **2.5)** The reference elements are assembled together in accordance with the angles and corners of constructive diagonals.

This technique provides for the possibility to arrange the three-dimensional element both inside the product and in its exterior, obtaining different visual effects, thus contributing to the diversification of the external appearance of garments.

Figure 2: Application of the "Origami" technique on the façade of product

3. **The "Accordion" technique** is a transformational reconstruction technique for diversifying the external appearance of reference elements of garments by the multiplication of the selected element. The work process includes the following stages:
   - **3.1)** A paper element of the initial three-dimensional element is elaborated so as to project its shape and dimensions directly onto the product element;
   - **3.2)** A plane projection of the three-dimensional element is obtained and upon necessity its contour lines are reconfigured;
   - **3.3)** The number of component strata of the three-dimensional element is determined so as to provide for the „Accordion" effect;

3.4) Paired reference elements of the three-dimensional element are cut. These may have identical or similar contours. The contours of constituent reference elements of the „Accordion" may contain dimensional differences when the overlapping effect is involved;

3.5) The paired reference elements are assembled and then interconnected so as to compose the three-dimensional element.

The "Accordion" reconstruction technique may be used for the spatial transformation of any product area, providing for the originality of shapes, structure and colors.

Figure 3: Use of „Accordion" technique for making a shirt-type collar

4 CONCLUSIONS

The heuristic methods of searching for new original solutions provide good results in the elaboration of new garments. These solutions were initially perceived as unacceptable by shape or content but later they became modern.

The non-traditional methods of designing garments have generated the appearance of a series of transformational reconstruction techniques allowing to obtain original products owing to the presence of three-dimensional elements of shape, color and architecture in their structure.

The employed techniques allow to diversify the external appearance of garments by intervention into the initial structure of their shapes. At the same time they provide for the possibility to use the materials of various colors and to obtain visual illusion effects in order to harmonize the wearer's image.

The prototypes of garments created by the application of transformational reconstruction techniques are regarded as perspective models and potential sources of inspiration for the manufacturing of garments at the industrial scale.

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