

## DESIGNING TRANSFORMABLE PARTS OF CLOTHES IN THE AUTOMATED SYSTEM

### ПРОЕКТИРОВАНИЕ ТРАНСФОРМИРУЕМЫХ ДЕТАЛЕЙ ОДЕЖДЫ В АВТОМАТИЗИРОВАННОЙ СИСТЕМЕ

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*The article is devoted to automated design of transforming parts of clothing. Based on the conducted research the author pointed out transforming parts of garments in computer language HTML. In the software language HTML the automated mode selects the methods of transformation of women's jacket, lower parts, types of collars and sleeves.*

*Статья посвящена вопросам автоматизированного проектирования трансформирующих деталей одежды. На основе проведенного исследования авторы указали трансформирующие детали швейных изделий в программном языке HTML. В программном языке HTML в автоматизированном режиме выбираются приемы трансформации женского жакета, нижних деталей, виды воротников и рукавов.*

**Keywords:** transformation of parts, automated mode, conversion, system of computer aided design, HTML program.

**Ключевые слова:** трансформация деталей, автоматизированный режим, преобразование, системы автоматизированного проектирования, программа в языке HTML.

The main objectives of the computer aided design system (CAD) is to improve the quality, to reduce material costs, to shorten design time of models in production. In the process of levels automated design of clothing were analysed in the field of garment production. Based on the presented facts the following systems were analyzed which are used in the global information system: "Grafis" , "Julivi", "Gradation", "Designer", "Cadrus", "Autocut", "Staprim", "Coat", automated working place (AWP) "Technologist" and others. Methods of perspective design of industrial products are based on the use of modern technical equipment allowing to improve the quality of design and reduce the time of preparation. Design procedure is the part of the design period,

determined by the emergence solutions in design of garments. There are several modes of design depending on human intervention and the rules of use of e-quality. The automated mode of design is carried out in the formation of several areas of design ready-made solutions without human intervention. As a result, on the basis of features of processing theory and design of garments was considered optimization methods of designing clothes and designing the basic parameters of the combination, a product with the use of the information system [1].

CAD (computer aided design system) is a mathematical sample of methods and algorithms for solving problems. Mathematical sample displays a set of mathematical objects

(numbers, vectors, matrices, graphs) and common modeling techniques. Mathematical methods include the methods and rules of solving problems. Algorithm is a consequence of mathematical operations in solving the tasks. Collection each convertible details in the information system can be seen in the program of the HTML language. Modern technique and technology of clothing manufacture is also developed and automated, so the program of HTML displaying methods of transformation and installation of each transforming the parts into a whole product which is based on automatic design of transforming parts of garments. (Hyper Text Markup Language) is a markup language used to encode documents. In the program of the HTML language by selection methods of garment transformation you can see its compositional change. Sleeves, collars and lower parts of garments were transformed by the methods of separation– connection, tension – compression, disappearance – appearance, replacement of other parts, combination – insertion, transference. The transformation of sleeves, collars, lower parts and ornaments in different shapes in automatic mode by the method of tension - compression in the

program of the HTML language program is shown in Fig. 1.

In the process of selecting models of apparel you should pay attention to the problem of mathematical description of transforming parts of clothing. Here, converting the transformative elements of parts in a woman's jacket in Fig. 2 were composed several types of clothing in different models. The pattern combination transforming parts of designed garments were divided into six techniques and as a result of study models of garments were designed [2].



Fig. 1

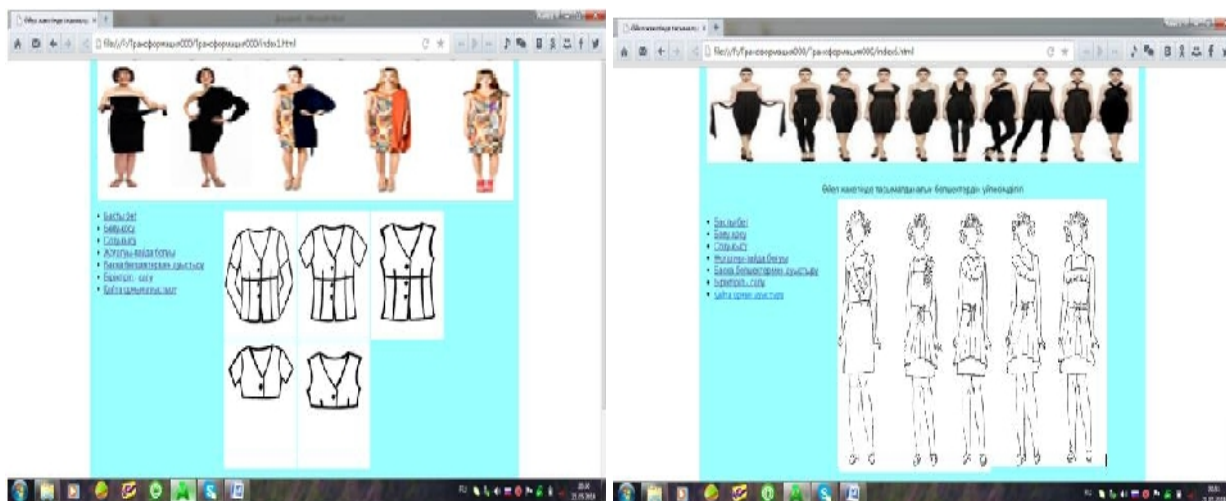


Fig. 2

– Studying the method of the separation–connection in designed model of transferable items were transformed by regularity of the separation– connection. In this method the shape of the product does not change, only details are separated and connected.

– Studying the method of transference by changing the shape of transforming parts of garments into another shape, two-sided models and a multifunctional images were designed.

– Studying the technique of disappearance –appearance, designed the compositional solutions of details of sleeves and collars in

different shapes were justified on symmetric trends and transformed with decorative finishing material elements.

– Studying the method of replacing by other parts, transforming parts were transformed into patterns of combinations of symmetric trends and formed in various forms.

– Techniques of stretching-shrinkage, studying properties of elastic fabrics in stretching shrinkage method, items of clothing and decorative elements have been transformed into different shapes and transforming parts were designed in bulk plane in composite solution of decorating.

– Studying the method of combination - insertion, the combination of finishing and decorative elements of different shapes were replaced with a variety of high transferable parts and is designed on the basis of interchangeability of parts.

When analyzing the transformation of the transformable clothing in a mathematical calculation, i.e. on the basis of the transformed parts of the same basic model many functional sets are formed.

We denote  $y$  the target characteristics (selected clothing):

$$y = f(x_1, x_2, x_3, x_4, x_5), \quad (1)$$

here  $y$  – target function, and  $x_i$  ( $i=1,2,\dots,5$ ) – dependant variables (characteristics). In each calculation only one function value is calculated.

Variable  $x_1$  depends on  $x_{11}, x_{12}, \dots, x_{16}$  elements, i.e. selection of transfer details method:

$$x_1 = (x_{11}, x_{12}, x_{13}, x_{14}, x_{15}, x_{16}). \quad (2)$$

Here  $x_{11}$  – separation– connection;  $x_{12}$  – transposition;  $x_{13}$ – disappearance-appearance;  $x_{14}$  – stretching- shrinkage;  $x_{15}$  – changing by other details;  $x_{16}$  – combination-insertion.

In the automated mode the transformation of the product in five types is shown in Fig. 2, by selecting the method of separation– connection. By selecting any item its transformable parts are displayed. By selecting in automatic mode transformable lower parts of sleeves, collars, trimmings women's jacket is converted into various products.

In the automated HTML program in the method of transformation shown in Fig. 2, studying a method of replacing finishing details were converted into automatic mode of transformable details in girls' dresses. Pressing a transformation command, finishing details in the dresses of the girls by moving the top of the belt and ruffles were converted automatically into a composite combination.

Variable  $x_2$  is dependent on  $x_{21}, x_{22}, \dots, x_{2n}$  elements, i.e. selection of lower jacket details;

$$x_2 = (x_{21}, x_{22}, \dots, x_{2n}), \quad (3)$$

- variable  $x_3$  is dependent on  $x_{31}, x_{32}, \dots, x_{3n}$  elements, i.e. selection of collar;

$$x_3 = (x_{31}, x_{32}, \dots, x_{3n}), \quad (4)$$

- variable  $x_4$  is dependent on  $x_{41}, x_{42}, \dots, x_{4n}$  elements, i.e. selection of sleeve;

$$x_4 = (x_{41}, x_{42}, \dots, x_{4n}), \quad (5)$$

- variable  $x_5$  is dependent on  $x_{51}, x_{52}, \dots, x_{5n}$  elements, i.e. selection of accessories details;

$$x_5 = (x_{51}, x_{52}, \dots, x_{5n}). \quad (6)$$

In the HTML program in Fig. 3 in techniques of disappearance- appearance of the transferable sleeves, collars, lower parts of women's jacket, decorative items, decoration materials are converted into automatic mode. The size of collars, sleeves and decorative details of the jacket will disappear and reappear. Every detail will be converted into a composite combination.

In the automated HTML program, stretching-shrinking technique is shown in the 3th picture, in the composite decision of the lower part of women's jacket, types of sleeves and collars are stretched and shrank in automatic mode. Stretching-shrinkage method by selecting every detail of jacket transformation is made automatically in the command menu.

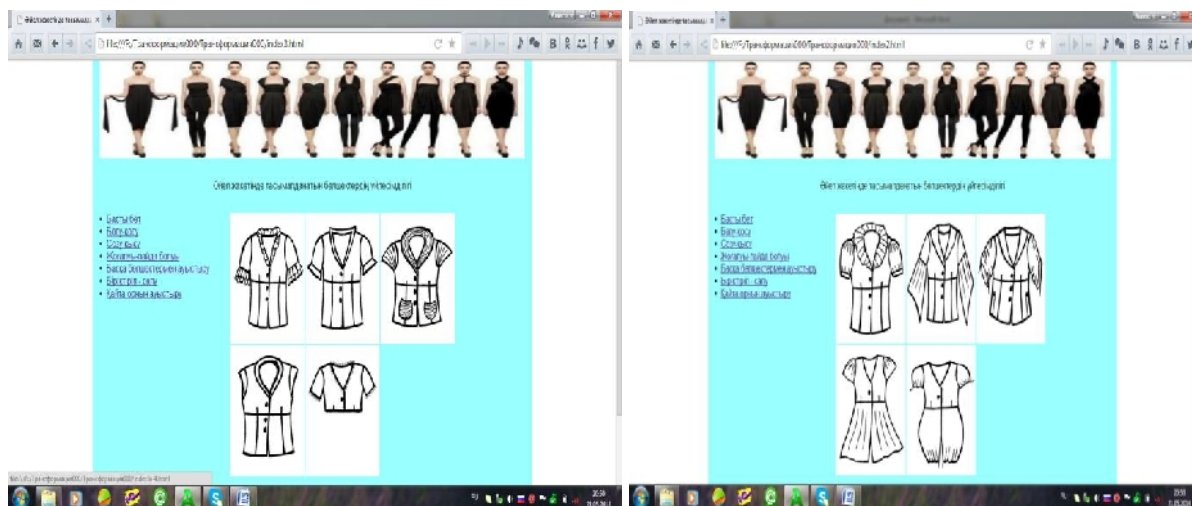


Fig. 3

We have considered a mathematical description of convertible details of the studied garments in the automatic design in the HTML language program. Techniques of transformation, lower parts of the jacket, the types of collars and sleeves, fittings, finishing materials were selected as the key elements in the transformation of transformable garments.

As a result of research work transformable parts of garments were designed in the automatic mode in the HTML program. Basic information, methods of transformation, based on the transformation of sleeves, collars and lower parts of garments are implemented in the program, the types of clothing, shapes of the parts, styles and range have expanded. Methods of transformation were used in the design of transformable parts of garments in the composite solution.

Management system of database in HTML will reduce the delivery time to the production technological process, documentation in garment enterprises, improve product quality, keep information basic fund database in

groups, improve processing method and reduce the time spent on a garment manufacturer with production. As a result, images of multifunctional garments were formed on the same basic models that meet the requirements of differentiated consumer demand and increased the production of new special models that meet the requirements of market competition. The system of automatic design provides a differential growth of demand, manufacturing of garments, converted in accordance with certain requirements of the consumer and reducing the amount of manufacturing monotonous goods.

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