Scholarly communication paper

DIVERSIFICATION OF ASSORTMENT OF JACKET-TYPE PRODUCTS FOR MEN

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Abstract: *The work considers the problem of developing the assortment of products for men by applying the principles of modular design. Theoretical studies were aimed at determining the methodology of modular design and principles of its application in diversifying the assortments of products for men. The researchers have defined a system of coefficients for the evaluation of systems of models of products elaborated with the use of modular design principles. The experimental researches included the formation of a nomenclature of constructive modules for jacket-type products, creation of a database called SB-GIOVANI in the automated design system Investronica and elaboration of series of new models and series of jackets for men by using the nomenclature and the mentioned database. Owing to the implemented SB-GIOVANI database and the nomenclature of constructive modules, it became possible to elaborate a wide series of new proposals and the basic model was used for the subsequent manufacturing of products in a wide gamma of sizes, waistlines and conformance groups at experimental stage.*

Keywords: *products for men, principles of modular design, jackets for men, constructive modules.*

INTRODUCTION

This work represents the applicative results of a study of diversification of assortment of jacket-type products for men implemented in the conditions of an enterprise specialized in garments for men. The actuality of this study results from the development and diversification of the assortment of models of products for men manufactured in quality assurance conditions, optimization of production costs and efficient use of technical facilities owing to the application of modular design principles.

THEORETICAL ASPECTS

The principle of modular design implies the elaboration of finite products using a set of unified component elements with observation of their mutual correspondence, functional, constructive and aesthetic parameters. Modulation and aggregation offers the possibility to structure a product from a small number of common-type elements totally or partially meeting some common geometrical and functional requirements. Modular design is based on the elementary structural entity of *constructive module* with the following definition: „common-type element of a structure, functionally independent, unified by the implementation principle" [1].

The modular design methodology is based on the legalities of model constructions and structuring the product into interchangeable component elements. The application of modular design principles implies the implementation of the following categories of works:

1) Analysis of basic constructions and their legalities by types of products.
2) Identification of constructive modules – general and variant constructive modules.
3) Elaboration of the nomenclature of constructive elements and encoding of the nomenclature elements.
4) Diversification of assortment and elaboration of new models by aggregation.
5) Evaluation of efficiency of modular design activity.

The application of modular design system for elaborating product structures is a direction of unifying and standardization thereof, providing also the following specific advantages in addition to the general ones:

It allows to implement the basic structure (BS), the basic common-type structure (BCTS) and the model structure (CM) using the aggregation methods from among the following unified structural elements;

Implementation of a multitude of basic common-type structures (BCTS) by changing initial data;

Raising the efficiency of design process by getting rid of repetition of some works and reduction of design timings.
If the constructive module is adopted as an elementary structural entity of product, then it is proposed [2] to assess the degree of unification using the following quality unit indicators that may be included into the hierarchical scheme of quality indicators of the group of constructive unification coefficients K_{212}:

1) *The unification coefficient of a model construction* expressing the degree of unification of constructive modules of a model construction of a new product

$$K^{MC}_{ui} = n^{MC}_{ui} / n^{MC}_{u}, K^{MC}_{ui} < 1 \quad (1)$$

where: n^{MC}_{ui} – number of common-type constructive modules for the type of design product used in the model structure; n^{MC}_{u} – total number of constructive models of the analyzed model structure.

2) *Coefficient of reuse of constructive modules* in a series of products expressing the degree of unification of model structures in a series of products

$$K^{MC}_{rs} = n^{MC}_{us} / n^{MC}_{s}, K^{MC}_{rs} < 1 \quad (2)$$

where: n^{MC}_{us} – number of unified common-type constructive modules characteristic for all the model structures of a series of products; n^{MC}_{s} –total number of constructive modules for the products of series.

EXPERIMENTAL STUDY

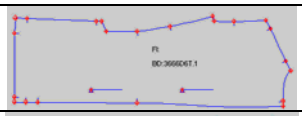
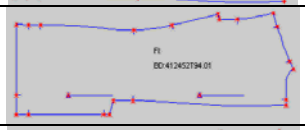
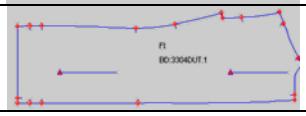
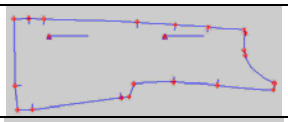
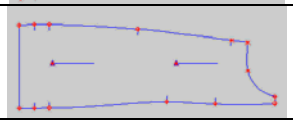
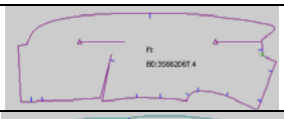
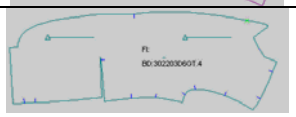
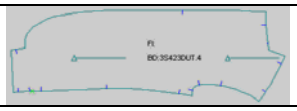
The experimental study considered the application of modular design methodology for the diversification of assortment of jacket-type products for men, a stable assortment allowing to apply efficiently the principles of constructive unification.

In order to establish the nomenclature of constructive modules for a men's jacket we considered the optimum division of product into component elements. The structuring of jacket into component elements is done based on the principle of interchangeability in a modular system, defining the properties of an element of product that may be found in the same constructive-technological variant in different models of jackets. 16 constructive modules have been identified. The Model structures of series will be established based on the general constructive modules: façade, wedge, back and sleeve and the variant constructive modules: collar, closing system, trimming, flaps, pockets. The constructive models elaborated in the nomenclature determine more variants of basic common-type constructions depending on the used initial data: values of anthropometric indicators; values of legerity additions depending on the trends of fashion; constructive particularities of product. The elaboration of nomenclature allowed to visualize clearly all the general constructive modules and the variant modules, as well as to automate the process of design and elaboration of technical documentation.

The modular design of products is a perspective direction of unification and elaboration of common-types, since the formation of nomenclature and databases of constructive modules allows to automate efficiently the design principles.

The experimental studies included the formation of a nomenclature of constructive modules for the assortment of jacket-type products for men and the creation of a database SB-GIOVANI in the automated design system "Investronica", the GENMA software that included the nomenclature of constructive modules elaborated in the PGS-MODELLING design software, as well as a component of gradation norms for the jacket-type product for men. The GENMA software is tightly connected with the PGS-MODELLING design menu and the framework fit menu MARK, the framework drawing menu PLOTWIN. The major functions of this software are: creation of a library of titles and types of reference shapes, models, sketches, firms; search for reference shape data based on the specified parameters; printing of various reports; model creation (based on specified reference shapes); administration of fitting process based on the types of fabric, cutting methods and other parameters, fitting of images into fabric and framework application rules. The SB-GIOVANI database implemented in the INVESTRONICA Automatic Design System and the nomenclature of constructive modules are used as a basis for the manufacturing of serial products for all sizes, waists and conformance groups allowed by the implemented database. Following the implementation of the created database it became possible to elaborate a wide series of models of jackets starting from a basic model, subsequently models of jackets have been elaborated that are now at the experimental stage.
In continuation one may consider a fragment from the matrix of constructive solutions for the identified modules – the table 1 and the models resulting from its application – figure 1.

Table 1: Nomenclature of constructive models (fragment). Men's jacket.

Module code	Element code	Module name	Schematic presentation
KM1	1	Back	
	1.1	With two cutouts	
	1.2	With one cutout	
	1.3	Without cutout	
KM2	2	Lateral wedge	
	2.1	With cutout	
	2.2	Without cutout	
KM3	3	Façade	
	3.5	With tapered cut pockets	
	3.6	With straight cut pockets	
	3.7	With applied pockets	

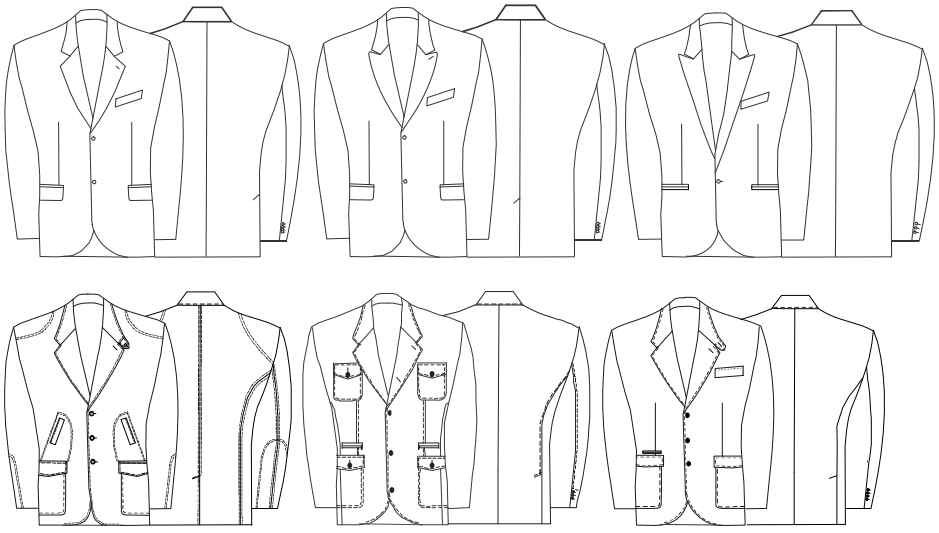


Figure 1: Series of jacket models (fragment)

In order to evaluate the series of models elaborated using the modular method we have calculated the coefficient of unification and the coefficient of reuse of constructive modules for the newly elaborated models (relationships 1 and 2):

1) Coefficient of unification of a model structure: $K^{MC}_{ui} = n^{MC}_{ui} / n^{MC}_{u} = 4 / 16 = 0,25$

2) Coefficient of reuse of constructive models elaborated in a series: $K^{MC}_{rs}=n^{MC}_{us}/n^{MC}_{s} = 10/16 = 0,625$

According to the obtained results each model may contain at least 4 common-type elements reusable in a series of jacket-type products for men.

In continuation one may consider several newly elaborated models in the result of diversification of modules, in lining view. The combination of models of basic fabric with the lining models results in the creation of new lined products, semi-lined products and only back-lined products. The variants of combining fabric and lining models characterize the interior processing of product. Diversification of products with lining occurs following the combination of constructive lining modules with small interior elements (tucks, flaps) and diversified trimming modules. Diversification may also be obtained by the play of colors in the models of basic fabric and lining increasing the number of models – see figure 2.

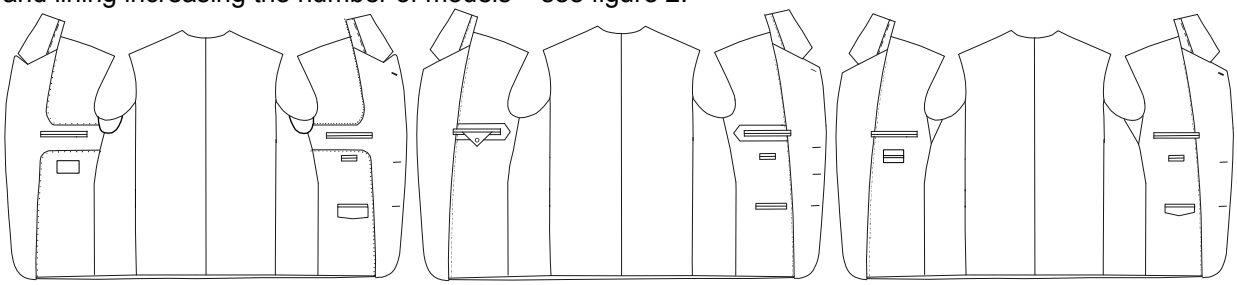


Figure 2: Proposals to diversify the jacket-type product for men

CONCLUSIONS

The work proposes constructive-unified series of models of jackets for men in a wide range of sizes, waists and conformance groups specific to the wearers of the 18 … 40 years age group. These series represent a set of modified constructive variants of similar or diverse destinations, their major characteristics being referred to the common-type basic structures (silhouette, cut of major reference shapes, processing methods) and the secondary ones – the closing system, collar, pockets – modified variants of series, i.e. the derived constructions of basic model.
The results of the studies have been proposed for implementation in a company specialized in the manufacturing of garments for men.
The formation of nomenclatures and databases of constructive modules by types and categories of products allow to apply efficiently the principles of automated design.
The use of modular principles in the process of designing garments allows to raise the degree of constructive and technological homogeneity of products with a positive impact over the efficiency pf design process and labor productivity that are imperative for the textile industry in the actual economic conditions.

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