



A CONTEMPORARY DESIGN APPROACH TO CREATING MULTIFUNCTIONAL TRANSFORMABLE CLOTHING

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Annotation: This article is devoted to the design of transformable clothing. It examines the design features of structures and components of transformable clothing for various purposes: workwear, clothing for tourism and sports, clothing for expectant mothers, school clothing for children, and other types of products. It outlines the goals and objectives of modern transformable clothing design, taking into account the environmental and economic situation. The article demonstrates that transformable clothing design is the future.

Key words: transformable clothing, transformable clothing elements, design engineering, principles, techniques and methods of transformation in clothing.

The modern lifestyle, rapidly evolving clothing production technologies, and the constant changes in the functional processes of human life are the primary reasons for the emergence of clothing that can satisfy all human needs and respond to a variety of demands and requirements. Consumers, who are interconnected with all aspects of their lives, as well as their surrounding environment, are naturally interested in using clothing that allows them to experience comfort and aesthetic satisfaction, regardless of the conditions under which it is worn. Therefore, a person's wardrobe must be constantly replenished with new clothing and accessories. This fulfills the desire to use these items multifunctional (in various combinations and in a variety of situations). As early as the 1920s, designing multifunctional items became one of the goals of designers and engineers. Proponents of this approach were called "functionalists" [1]. Their approach to design (the desire to create universal items) is capable of satisfying human needs and, moreover, conserving resources, which is extremely relevant given the environmental challenges facing modern society.

Transformable, multifunctional garments are already in high demand among fashionable, modern clothing. Both designers and engineers are focusing on creating multifunctional items (minimalism is one of the leading trends in modern clothing design) [1]. Minimalism has emerged in modern clothing design, the concept of which is to design clothing that is oriented toward creating a wardrobe consisting of a minimal number of multifunctional garments.

Modern clothing use creates conditions that allow for experimentation, i.e., the constant creation of a new, individual look. The ability to experiment, modify, and transform various items or elements of clothing allows consumers virtually unlimited opportunities to create a variety of fashionable outfits, presenting them in a variety of styles. This is the goal of modern designers. To achieve this, numerous design elements present in clothing are used. Many designers also incorporate these elements into the wearer's experience. Enormous opportunities lie in the use of shape-shifting items and elements of clothing, attachable and detachable elements, unconventional fashion additions, and various accessories.

When considering the term "transformation," the most common definition is: "transformation is the transformation, change in appearance, form, or essential properties of something" [2]. When considering this term in the context of clothing design, we have the following definition: "transformation is the property of objects in the spatial world to change their original forms and parameters during their existence or use" [2]. Therefore, according to the definition directly related to the process of designing clothing and its components, we can conclude that transformations occur both during wear with human intervention and throughout the entire lifespan of the product (it can change its aesthetic and physical appearance). In general, when characterizing a transformable object, it can be defined as "a material structure capable of assuming a number of different structural and aesthetic states through 'reconstruction.'" Consequently, transformable clothing is a flexible material structure (structural and aesthetic) that allows it to be transformed into various types of products or significantly alter the properties of these products.

Transformable objects, particularly clothing, have been around for quite some time. Information on various transformation options can be found in technical literature across a wide range of disciplines and fields [2]. This information suggests that the design of objects with a structure capable of modification constitutes one of the areas of form-creation in clothing design. This trend is also associated with the provision of many vital functions. Consequently, the transformation principle under consideration in the design of modern clothing is of great importance in the formation of products for various purposes.

Transformation in clothing design is defined by the dynamics of human movement, the transformations, or changes of clothing items and elements during use. Transformation can be achieved in two main ways [1]:

- the transformation of one form into another;
- the transformation of details within a single form.

When considering the process of clothing transformation from a cost-effective perspective, it should be noted that it will be convenient for both the consumer and the manufacturer. By purchasing one transformable item, the consumer is essentially purchasing several items identical in color, style, and material, but different in their functionality, performance, and ergonomics.

In addition to the economic aspect of designing these products, transformable clothing allows the consumer to utilize a number of other positive features. By using transformable clothing, a person can change their individual look in a relatively short time, meaning, without returning home, they can look appropriate for a particular setting and situation for a certain period of time. Using a minimal set of transformable items and clothing elements, the consumer has the opportunity to modify their look. It's also worth noting that transformable items in modern clothing allow for the creation of a personalized look for a dynamic lifestyle, which is associated with a certain frequency of functional life processes and changes in various events.

Over a long period of time, specific design, technological, and compositional approaches to transformable clothing and its components have been developed. This information allows us to understand the diversity of different transformation methods used in clothing. A classification of transformation techniques and methods for clothing items and components exists, which serves as the initial information for the design of modern transformable products for various functional, ergonomic, and aesthetic purposes [2].

Figure 1 shows the existing transformation techniques.

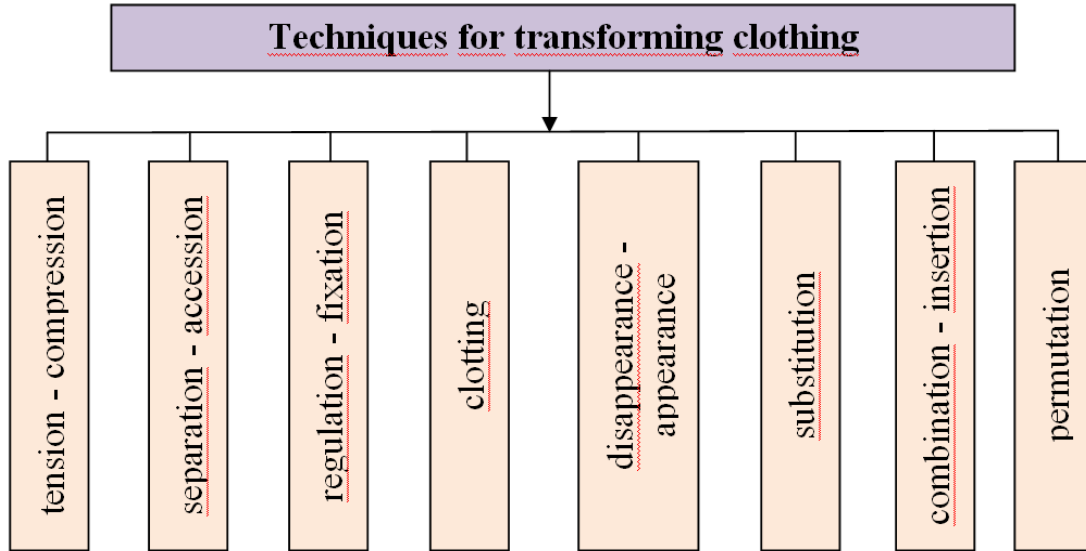


Figure 1 - Techniques for transformation in clothing

Along with the methods of form-formation, there is a classification of transformation methods [2]. Figure 2 shows the classification of transformation methods.

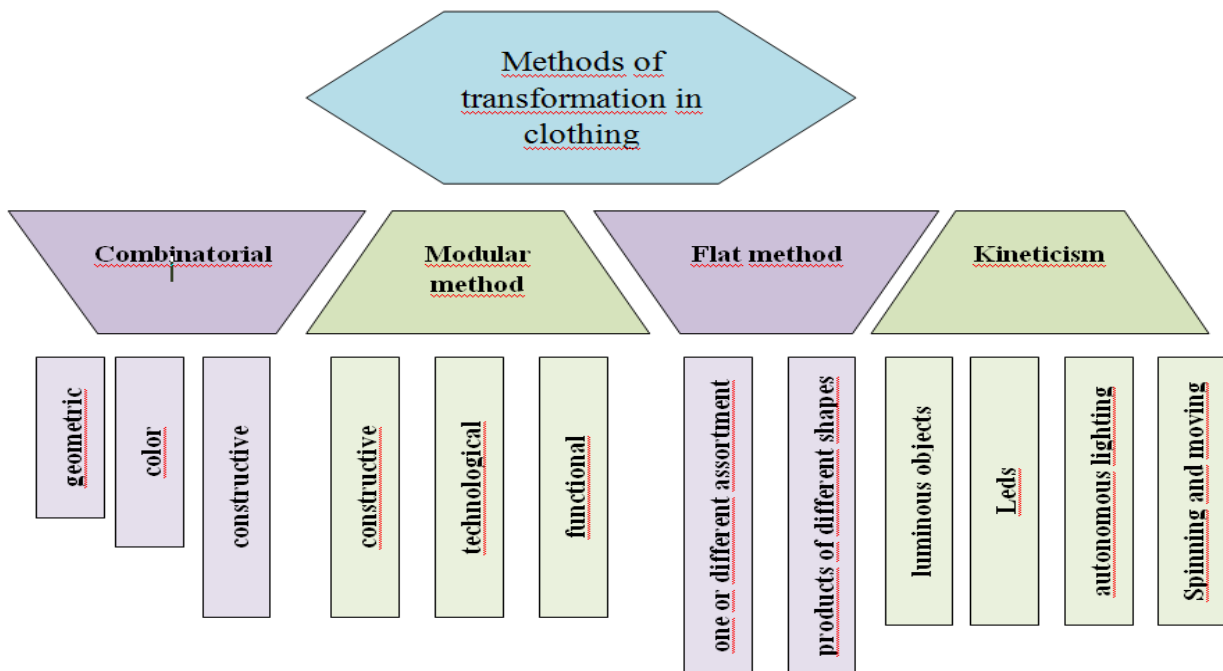


Figure 2 - Classification of transformation methods in clothing

The combinatorial method is the process of combining forms and their elements in various ways, or a search for variants, which ultimately leads to the creation of geometric, structural, color, and other combinatorial systems.

The modular method allows for the creation of various forms using modules. Ensuring their interchangeability implies structural, technological, and functional completeness, and the module itself can be a finished product or an integral part of a product, including one with a different functional purpose.

The flat-cut method involves using panels of material using the "unfolding and folding" principle to create products of varying assortment and shape.

Kineticism involves creating dynamic forms, decoration, and fabric patterns through the use of luminous objects, LEDs, autonomous lighting, and rotating or moving costume elements.

Overall, when discussing transformable clothing, it should be noted that it will always be of interest to consumers. Transformable clothing gives consumers freedom of choice when creating their personal wardrobe and can encourage experimentation and improvisation. Transformable clothing allows consumers to save time and money, extending the lifespan of their clothing.

Along with the techniques and methods for transforming transformed clothing, there are various transformation principles that are fundamental to form-building. These principles of clothing transformation allow the systematization of various design components as initial transforms. For example, the following transformation principles can be attributed [2]:

- transformation of one form into another (e.g., changing the length of a garment, transforming one element of a costume into another (a hat into a bag, etc.);
- transformation of parts within a single form of a garment (e.g., elements of clothing are transformed (folded, folded, tied, braided, etc.).

In general, the process of transformation - the transformation of clothing (and its individual elements) - can be multifaceted. This process has a positive aspect, as the designed product, due to its diversity and multifunctionality, does not become boring, and therefore its lifespan is extended.

Modern fashion designers, drawing on the techniques, methods, and principles of transformable clothing, have proposed an original response to the economic crisis, which has forced consumers to economize on clothing: "multifunctional" styles that can be transformed, for example, from a coat into a jacket, or from a dress into a skirt.

Transformative elements are widely used in special clothing. For example, thermoregulating clothing protects the human body from the harmful effects of elevated temperatures and solar radiation [3].

Transformable clothing has also found widespread use in tourism, especially recreational. Any hiker planning a long-term hiking trip pays close attention to their backpack. They pack only the essentials, otherwise the backpack will be heavy and cause certain inconveniences during the trip. For example, using the transformation of a jacket into a backpack bag when weather conditions change on a hike [4].





Figure 3 - Converting a jacket into a backpack

The convertible jacket-style garment includes front panels, a back panel with a pocket and a flap, created in the seam where the back panel, sleeves, and hood meet. When transforming the jacket into a backpack, the pocket is turned inside out, creating the backpack chamber. The jacket is tucked into the chamber, and the pocket opening is closed using clips located on the pocket flap and at the bottom of the pocket lining. The backpack-style bag has straps located in the upper and lower seams of the pocket lining, and the backpack straps are converted into a bag handle using a zipper. This design expands the product's functionality and improves ease of use during transformation. A drawback of this garment is that it cannot be transformed into a bag without turning it inside out; it requires an additional flat piece located on the inside of the back.

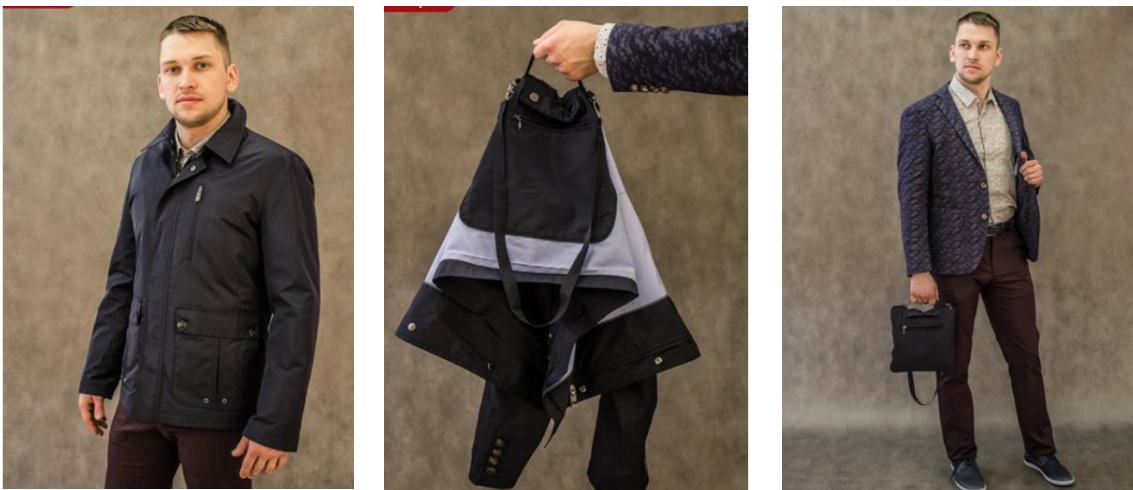


Figure 4 - Carducci Men's Convertible Jacket





Figure 4 - Hunting clothes that turn into a bag

Any solution in the design of transformable clothing is aimed at expanding the functionality due to the suitability of clothing for use.

Transformable, multifunctional garments are now among the most sought-after fashionable items in modern clothing. These multifunctional garments, which can be transformed with minimal time, can meet the needs of today's active, dynamic lifestyles and also help conserve resources, which is crucial given the environmental challenges facing society.

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