

استحداث تصميمات طباعية مبتكرة من المظهر السطحي للنسيج ثلاثي الأبعاد وتوظيفها في مكملات الزي

Developing innovative printing designs from surface appearance of three-dimensional fabric and employing them in clothing accessories

م.د/ نهله شعبان شحاته حسن

مدرس بقسم الموضه -المعهد العالى للفنون التطبيقية- السادس من اكتوبر

Dr .Nahla Shaban Shata Hassan

The higher institute of applied arts, Lecturer at Fashion Department

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dr.nahlah.s@gmail.com

Research summary

Three-dimensional fabrics are one of the most important modern innovations resulting from high-tech technology and scientific progress, which may contribute to their diversity, many distinct properties, and their plastic and aesthetic potential. The different surface textures have a role in enriching the printed design of clothing supplements, as the most important factors that contribute to the success of the printed artwork are the choice of surface, and the appropriate printing to determine the appropriate technical foundations for pastes and the possibility of developing artistic and technical treatments that are compatible with the surface textures of these printing surfaces, which prompted the researcher to search for a new and diverse vision for textile printing designers in creating new designs and benefiting from them as being supplements for printed uniforms.

The research focused on how to take advantage of the newly developed textile printing pastes to achieve the third dimension, to obtain designs with diversity and richness, three-dimensional textile technology and its unique texture and distinct surface appearance, which have a significant impact in adding some properties to the product and as a new source of artistic visions in the field of printing design and their adaptation in design lines for new artistic formulations for outfit complements.

Abstract:

Three-dimensional fabrics are one of the most important modern innovations resulting from high-tech technology, whose diversity, many distinct characteristics, and its plastic and aesthetic capabilities for its different surface textures may contribute to enriching the printing design of clothing accessories, as the most important factors that contribute to the success of the printed artwork is choosing the appropriate printing surface, and to find out the appropriate technical foundations for pastes and the possibility of developing technical treatments that commensurate with the surface textures of these printing surfaces, which prompted the researcher to search for a new, diverse vision for textile printing designers in creating innovative designs and benefiting from them in the complements of printed clothing accessories. The research focused on how to take advantage of the new textile printing pastes to achieve the third dimension to obtain designs with diversity, richness and three-dimensional textile technology and its unique surface texture and appearance, which has a great impact in adding some properties to the product and as a new source of technical visions in the field of print design and

adapting it in design lines for new artistic formulations and employing them in clothing accessories.

Key words:

three-dimensional textile, printing design, clothing accessories, 3D fabric, graphic design, uniform accessories

Introduction:

Printed textiles are one of the industries that are based on art and technology, and are affected by the era in which we live in, with the development and modern technologies because of their impact on the final product in terms of improving its properties, characteristics, and aesthetic appearance and presenting it in a form that suits its functional performance.

Textile materials, through some techniques, give them multiple plastic possibilities that give them a new form of artistic formulation. Therefore, the material is considered an essential focus of the design process, with its characteristics and surface textures that have their own aesthetic and plastic values to highlight their artistic richness. Three-dimensional fabric excites the designer and opens up areas for innovation due to its nature. It is considered a material media that helps the designer develop new products in the field of applied arts, especially the field of fashion and its accessories. The phenomenon of adornment and beautification is considered a human phenomenon that has been a characteristic of man since ancient times, and it is difficult to determine the history of this phenomenon that developed over different times and regions.

Designing costume accessories is considered a fine art, it requires a designer who innovates, creates, and possesses a conscious sense and art, using materials, tools, and techniques to achieve both artistic and functional values.

Research problem: The research problem lies in answering the following questions:

1. To what extent is the design thinking of textile printing designers affected by the surface appearance of the 3D fabric?
2. How to benefit from different printing pastes and apply them to achieve the third dimension in creating printing designs to complement uniforms?

Research objectives: The research aims to benefit from the surface appearance of three-dimensional fabric as a new source of artistic visions in the field of printed design for clothing supplements in the style of abstraction and modification to develop innovative design solutions, and to use different printing pastes to obtain designs with diversity and richness and achieve three-dimensional effects suitable for printed uniform supplements.

Research hypothesis: The research assumes that the surface appearance of three-dimensional fabric and various printing pastes supports the innovative vision of textile printing designers to enrich the printing design of uniform supplements with new ideas and artistic applications of a special artistic nature.

Search limits:

Temporal limits: our contemporary time

Spatial limits: The research samples were produced at the National Research Center - Dokki and Banha University.

Objective limits: The theoretical aspect deals with the study of three-dimensional fabric, its different types, its surface appearance, and its applications in the field of fashion.

The research deals with the experimental aspect and applied methods. The practical aspect of this research is limited to employing three-dimensional fabric in creating designs for printed accessories (belts, shawl, bags, accessories).

-Techniques used in printing research samples: direct silk-screen printing and the use of some types of paste.

Three-dimensional fabrics are classified according to:

1- Structural composition

2- The weaving process (2: p. 66)

Three-dimensional fabrics are classified according to the structural composition of the three-dimensional fabric into:

1- Solid three-dimensional knit fabric: This type is divided into three types (Multi-layer fabric, perpendicular fabric and interlocking corner fabric).

It can be obtained by combining groups of straight threads in the three main directions (length, width and height). It affects its properties, gives hardness and improves the tensile strength properties of fabrics.

A- Three-dimensional, multi-layered solid knit fabric: It consists of multiple layers, as shown in Figure No. (3), and each layer has its own sets of warp and weft, which connect these layers with stitching (17 p. 69). This type is characterized by its strong structural composition and dimensional stability.

B - Orthogonal three-dimensional knit fabric: It is a type of (nonwoven) fabric, and the production method and product are different from any other textile product. It is characterized by some properties such as durability properties. As the number of layers increases, the difficulty of cutting increases, the fabrics resist tearing, and the tensile strength increases.

C - Three-dimensional knit fabric with interlocking corners:

This type consists of at least two groups of warp and weft threads, and stuffing threads (stuffer yarns) can be added, which affects the increase in the size of the fibers and the durability of the surfaces. It also contains different numbers of layers of weft threads, which gives a difference in thickness (11 p. 195) and with an increase in the number of the layers in the three-dimensional fabric with interlocking corners, it gets distinguished by some properties, including resistance to bending, increased tensile strength, and durability.

Figure (3) shows a three-dimensional cohesive fabric with interlocking corners

2 - Three-dimensional hollow fabric: It is divided into those with a flat surface and those with an uneven surface (16 p. 15). The process of forming three-dimensional hollow fabric is based on the basis of multi-layer fabric, where the layers of fabric are connected and separated in specific areas (19).

3 - Three-dimensional cochlear tissue:

Three-dimensional (shell) fabrics are a special type of three-dimensional fabric, and although this product may contain one or several layers, the final product is always a three-dimensional product (17 p. 147). This type of fabric consists of shell structures with curves while maintaining continuity of fibers involved in operation. There are several methods for producing this type, including the method of separate folding (19), the method of combining different textile structures, and the method of casting or shaping.

4 - Three-dimensional knotted fabric: These fabrics are woven on flat looms, and when they come off the loom, they are pulled and shaped (12, p. 941). This type refers to the fabric that is easy to form in the form of a network of different tubes or solid parts connected to each other. (17, p. 184)

Features of 3D fabrics: 3D fabrics have many features, which were the most important factors attracting their use in the printing design of clothing supplements, as the most important factors that contribute to the success of the printed work are choosing the appropriate printing surface, and determining the appropriate technical foundations for the dough and the possibility of developing artistic and manual treatments. It is compatible with the surface textures of these printing surfaces, which depend on the fabric structure of the fabric. One of its most important features is having a light weight due to being filled with air voids, (27) flexibility and diversity in surface textures and its use as a means of reinforcement and strengthening of composite materials. Among its most important features is high durability, tensile strength and endurance. Methods of obtaining the third dimension: The third dimension is obtained through different implementation methods, whether in the weaving stage using various textile compositions and using special types of threads and processing methods. The method of processing to obtain the third dimension is related to the limits of the research and the experimental aspect, as this method affects some of the functional and aesthetic aspects of printed fabrics for uniform supplements.

Preparation and its impact to achieve the third dimension:

Processing methods are divided into chemical methods and mechanical methods (54 p. 91).

Chemical methods: Some chemicals, such as strong caustic soda, are used on cotton fabrics during the printing process. When used, only the printed areas shrink and produce an effect that leads to the shrinkage of the printed areas and thus causes the non-printed areas to wrinkle, which leads to the protrusion of the adjacent areas as shown in Figure (6), the effect of prominent creasing is obtained (15). The more the printed areas shrink or contract, the more obvious the three-dimensional effect becomes. The fabric must be 100% cotton and light in weight (20). Figure (6) shows the effect of prominent wrinkles (21).

The effect of dissolving in solutions (Burn Out)

Through printing, it is possible to obtain the effect of the third dimension by placing chemical materials in the printing paste, and it is determined according to the type of fabric, so that the fabric is a mixture of two materials, one of which is partially corroded and the other is resistant to it, such as fabrics mixed from protein fibers (silk) and cellulose fibers (cotton - viscose). We put the printing paste Sodium Hydroxide Solution. In the case of using fabrics mixed with polyester, we use Sodium Hydrogen Phosphate, along with cotton fibers and polyester, we get the effect here by corroding parts of the fabric.

Research results

Through the theoretical and practical framework and after applying the questionnaire, in addition to analyzing and processing the results statistically, the following was revealed:

١- It is possible to take advantage of the surface textures of three-dimensional fabric to create innovative experimental and design approaches, while employing them in the field of print design as complements to uniforms.

- ٢- Three-dimensional fabrics are among the most important technical fabrics due to their distinctive features, characteristics, and many applications.
- ٣- The extent of flexibility, and speed of using computers to create design ideas.
- ٤- The use of some different and unconventional types of printing paste has a significant impact in adding some distinct properties and an innovative artistic appearance.

Recommendations

- ١- Linking science, arts, and technology enriches the fields of design.
- ٢- Employing modern technological methods in developing the field of textile printing.
- ٣- The multiple applications of three-dimensional fabric have contributed to opening the way for humans to discover a new horizon in various scientific and artistic fields.
- ٤- Expanding the production of technical fabrics with different usage properties.

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