

## **СУЧАСНА ТЕХНІКА І ТЕХНОЛОГІЇ MODERN ENGINEERING AND TECHNOLOGY**

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### **3D PRINTING IN THE MANUFACTURE OF SEWING PRODUCTS**

*The possibilities of using 3D printing for the manufacture and finishing of garment parts and the prospects of using flexible filaments to create them are described. Details and finishes that can be manufactured using additive technologies are specified. The possibility of manufacturing elements of garments obtained by Flextrans technology with the help of additive technologies, namely 3D printing, is described.*

Innovative 3D designing and 3D printing - one of the most important technologies of the fourth industrial revolution and are widely used in various sectors of the national economy. 3D printing is used in many industries and areas of activity, the range of its potential applications is constantly growing [1-3]. In addition to the usual areas, such as prototyping, creation of architectural models, parts, master models, household items, the use of 3D printers in the fashion industry are no exception and every year the technology improves [4].

With the help of 3D printing, you can set up the production of clothing or shoe parts or additional elements for them. The use of 3D printing makes it possible to create a large number of different designs and not worry about changes in the production process. In addition to 3D printers for the production of individual parts or accessories, do not require specialized equipment. This point is directly related to why 3D printing is widely used in the creation of designer or personalized products. Creating unique products does not require your own production process.

Global 3D printer companies such as Stratasys and 3D Systems are working with fashion designers to create expressive designs, and Time has included Stratasys 3D print design in collaboration with Iris Van Herpen in the list of the 50 best inventions of 2011. However, although 3D printing technology is being actively researched and developed in other fields, the use of 3D printing technology has been relatively less studied in the fashion industry due to material constraints, difficulties in acquiring technology and the fact that the product should be worn on the human body.

However, additive technologies are in demand in the fashion industry. Today, designer collections of clothes, shoes, and accessories made with the help of 3D printing are known. So far, these products belong to the category of works of art, not items of everyday clothing [5]. The disadvantages of modern printed clothing are not only the futuristic and singularity of the models but also the lack of flexibility of monofilaments. These shortcomings significantly limit the modification of 3D products in terms of mass use.

However, rigid and strong polymers (ABS, PLA) can be used in complex form-setting frame systems of garments [6]. Plastic 3D frames can replace materials such as wood, gypsum, metal, and 3D printing technologies can compete successfully with molding and casting.

Flexible elements and garments can be created by 3D printing from thermoplastic elastomer (TPE) or its variant - thermoplastic polyurethane (TPU), which is durable and abrasion-resistant.

TPE is a thermoplastic elastomer. It is a mixture of hard plastic and soft rubber, so it has both thermoplastic and elastic properties. TPE covers a wide range of flexible materials, including thermoplastic polyurethane (TPU), thermoplastic copolyester (TCP), thermoplastic polyamide (TPA). TPU - thermoplastic polyurethane. This is the most common type of TPE, which is in the group of flexible materials with greater rigidity [6].

With the help of additive printing, you can also create jewelry, decorative accessories, stiffeners for garments and hats, complex spatial shapes of details of supporting corsets, overhead details of special clothing and more.

The modern level of development of additive technologies, a wide range of 3D printers and the latest filaments expand the limits of the application of 3D printing technologies and allow to receive unique products for garment production. A review of the technical literature and experimental studies have shown the prospects for the use of additive technologies in the manufacture of garments.

Printed objects of three-dimensional forms are in demand today in the production of light industry products for various purposes: in casual and festive clothing, in hats, in special-purpose products and in rehabilitation.

Today, the design of light industry products is becoming more skillful, sophisticated, because every year the demands of customers to them are growing. The use of modern technology for applying plastisol three-dimensional images on the fabric (Flextrans technology) opens new horizons in order to move forward and stand out with good taste.

Flextrans is a thermal transfer that bends along with the tissue. Like Truflex, Flextrans images are consistently high quality with bright and rich colors, durable. Any combination of colors and sizes is possible (fig. 1).



**Fig.1. Flextrans technology on the fabric**

Due to its flexibility, Flextrans transfers are ideal for sportswear, lycra clothing and other fabrics with different stretch factors. Wide prospects for the use of this technology for advertising products, logo application, design decoration.

Additive technologies, such as 3D printing, can be an alternative to applying three-dimensional images to parts made with Flextrans technology.

Growing consumer competence and skills developed in the garment industry in graphics programs can not only simplify and expand the production of clothing created using three-dimensional technology and 3D printing, but also form a new aesthetic of the future society.

With the use of 3D printing in the manufacture of garments, you can develop accurate and perfect models, reduce production time, and reduce production cost.

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**СТАТИЧНЕ БАЛАНСУВАННЯ СПЕЦІАЛЬНОГО ТОКАРНОГО ПРИСТРОЮ ІЗ  
ЗАСТОСУВАННЯМ ПРОГРАМНОГО ПРОДУКТУ SOLIDWORKS**

***Static balance of a special turning device with the use of SolidWorks software***

*The method and calculations of static balancing of the part-device system in the software product SolidWorks in the design process are given.*

У певних умовах обробки різанням можуть виникати значні періодичні коливання технологічної системи верстат-пристрій-інструмент-деталь, які називають вібраціями. Вібрації технологічної системи викликають підвищене зношування деталей і вузлів верстата, збільшують зношування різального інструменту, погіршують якість обробленої поверхні, знижують точність обробки та обмежують продуктивність роботи верстата. Вимушені коливання виникають під дією періодичної збурювальної сили при дисбалансі системи. Усунення появи вимушених коливань пов'язане, у першу чергу, зі зменшенням величини збурювальних сил, що досягається балансуванням системи деталей – верстатний пристрій. Статичне балансування системи ведеться після її виготовлення у шпинделі верстата, горизонтальних паралельних