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MANUFACTURING CLOTHING PARTS FROM COMPOSITE MATERIALS CONTAINING NATURAL FIBERS USING 3D PRINTING

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The garment industry in Ukraine is undergoing a renewal phase, thanks to the growing number of small and medium-sized enterprises specializing in the production of clothing and accessories. They are finding their place in the market, and in order to achieve significant success in the future, it is important for them to follow global fashion trends and implement the latest technologies and equipment [1].

In the coming years, the development of the garment industry will be determined by several trends. One of them is the transition from the use of expensive natural fabrics, such as linen, cotton, wool, to new synthetic materials filled with natural fibers. In addition, there is an increase in demand for innovative "smart fabrics", such as self-cleaning fabrics, reflective fabrics, or those that accumulate solar energy.

Another important trend is the individualization of clothing and the development of small factories that use 3D printing. The use of 3D printing in clothing production can radically change the garment industry, increasing its capabilities and efficiency.

3D printing, which is part of additive manufacturing, creates objects by sequentially layering material. These printers are typically faster, more affordable, and easier to use than other additive manufacturing technologies. They enable designers to print complex parts from different materials with different properties. 3D printing has already found application in many industries and is particularly promising in the production of industrial goods, including the garment industry [2].

The implementation of 3D printing in the field of high fashion is especially important. Already now on world catwalks you can see the collections of famous fashion designers who use 3D printing in the creation of their models or integrate 3D printed components into clothes.

Also, 3D printing technology allows you to use several different materials for the manufacture of one item of clothing. This approach allows solving problems related to the strength and elasticity of manufactured items.

3D printing materials available today can already be used to create clothing [3], underwear and their components (including accessories), and the range of such materials continues to expand. The appearance of new materials with appropriate technical characteristics opens up additional opportunities in this area.

One of the most promising directions for the creation of polymer materials with improved deformation and strength characteristics is the reinforcement of thermoplastics with fibrous fillers in the form of natural fibers. The popularity of natural fibers in the production of composite materials is growing in the most technologically advanced industries. The sewing industry can be such a branch.

Composite materials based on natural fibers have significant potential in the garment industry. The use of natural fibers such as linen, cotton, hemp, jute and

others meets the growing demand for environmentally friendly materials. They are biodegradable and renewable, which reduces their impact on the environment compared to synthetic materials. Composites based on natural fibers can combine advantages with improved characteristics such as strength, lightness, flexibility and thermal insulation. This expands the possibilities of design and use of such materials in various types of clothing and accessories. The integration of the latest technologies in the production of natural composites opens the way for the creation of unique fabrics with special properties, for example, improved thermoregulation or water repellency. This offers the fashion industry new creative opportunities. The use of composites based on natural fibers contributes to the reduction of carbon emissions and involves the garment industry in sustainable development. This is especially important in light of global climate change and the need to reduce our ecological footprint. Natural materials are often hypoallergenic and skin-friendly, making them the choice for consumers looking for comfort and health.

In general, the utilization of composite materials derived from natural fibers represents a groundbreaking advancement for the garment industry. These materials pave the way for innovation, foster sustainable development, and cater to the evolving needs of consumers.

The continuous evolution and integration of novel production technologies and cutting-edge equipment stand as pivotal imperatives for the garment industry, particularly in light of its escalating competition. Embracing these advancements becomes paramount to staying ahead in an increasingly competitive landscape.

Fused Deposition Modeling (FDM) technology is undergoing significant advancements for creating three-dimensional images, intricate patterns, prints, and decorative elements on fabrics, as well as producing accessories tailored to the garment industry's demands. This innovation involves employing a 3D printer capable of precisely printing using a blend of polymer materials and natural fibers, catering to the industry's specific requirements. This cutting-edge technique holds promise for revolutionizing the creation process of garments and accessories by enabling the incorporation of intricate designs and sustainable materials, offering new avenues for creativity and product differentiation in the market.

References

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