

Lilia CHERTENKO<sup>1</sup>, Olexandra NOS<sup>1</sup>,

Tatjana SPAHIU<sup>2</sup>

<sup>1</sup>Kyiv national University of Technologies and Design, Ukraine

<sup>2</sup>Polytechnic University of Tirana, Albania

## FASHION TRENDS IN AN ECO-FRIENDLY CONTEXT

**Purpose.** This paper depicts some aspects of modern trends in the environmental friendliness of fashion industry production and the sustainability of its products using modern digital technologies.

**Keywords:** sustainable fashion, eco-friendly footwear, digital technology, CAD design, ergonomic shoe last.

**Objectives.** To create an anthropometrically substantiated complex 3D footwear form, which is possible to realize by additive prototyping. To develop an ergonomic shoe last shape using initial digital information of 3d scanning the customers feet. On this base to design the original 3d shapes of the sole and monolithic footwear.

**Methodology.** The initial information for design of the shoe last and other footwear components is the results of anthropometric measurements of the feet, taking into account the requirements of biomechanics, physiology, and technological requirements [1]. The current conditions of conducting the design processes emphasize on the need to use modern advanced methods of research of the feet parameters. Therefore, contactless anthropometric measurements were carried out with the help of 3D scanning. The data obtained by scanning had to be averaged to develop the shoe last parameters using progressive 3D CAD named PowerShape. The result shape of shoe last was made by 3d printing method using Prusa printer.

**Research results.** The oversaturation of the world market with products has been evident for a long time. There is a growing awareness in a wide concept of sustainable production required everywhere, by making sustainable production a buzzword. Including fashion industry such concepts as “sustainable fashion” or “eco-fashion”, “circular economy”, “ecological materials”, “recycling”, etc. have started to be required and included in various process of production. Sustainability (ecological fashion) can be seen as an alternative trend to fast fashion [2]. The circular economy aims to improve the quality of life of society and provides

practical answers to how natural resources could be conserved for future generations and the environment can be improved [3]. Circular economy has embarked on a course of making fashion more eco-friendly. Recycling reduces the amount of waste and also gives them a second life. For example recycling plastic taken from bottles can be used as weaved or knitted for the upper part of the shoes and sneakers. It results eco-friendly, breathable and flexible. Other materials to produce leather are the so-called, vegetable or fruit "leathers". They are produced from waste and are starting to gain traction.

Speaking about the circular economy in the context of the development of the fashion industry, we can bring here the process of design. On the one hand, the very shape of the shoe provides for the widespread use of 3D modeling at various stages of the design process as designing a shoe last, modeling the shape of the sole and heels, modeling the general shape of the shoe, etc. On the other hand, the use of 3D prototyping for shoes can make a real transition to a more environmentally friendly product structure. 3D virtual displays of various models avoid extra costs related with prototype development by offering personalized products including garments, shoes, accessories, etc [5].

The situation in the footwear industry certainly requires a revision of today's realities and the introduction of new progressive technologies. Recycling footwear is extremely difficult due to the use of a large number of different materials, adhesives and chemicals in one product. Refunds of products sold are the highest due to the complexity of the selection and poor match between the parameters of the shoes and the parameters of the customers' feet. These factors can be partially addressed through extensive digitalization in the industry. Digital methods of obtaining initial information for the design of a complex 3D shape of a shoe last, together with effective software used for modeling, increase the level of customer satisfaction with purchased products by increasing the ergonomics of the shoe and the degree of compliance of the sample parameters with the physical parameters of the foot. Furthermore, 3D data can be easily produced by 3D printing technology that offers great advantages compared with traditional technology as CNC-milling, especially for small quantities.

This work depicts main steps followed to create an ergonomic shape of shoe last according to anthropometric data, generated by professional 3D foot scanner FootN 3D. 3D data are directly used for production using a 3D printer Prusa with 3mm shell thickness, 15 % infill and 0.3 mm print resolution. This ergonomic shoe

shape was a base for designing a mono component molded footwear sample and for original shape of sole. Parameterization of the design makes it quite easy to adapt all the developed components in accordance with the desired parameters of the last.

**Conclusion.** Sustainable fashion is an umbrella term for clothing, footwear and accessories that are created and consumed in a way that protects both the environment and those who make these products at the same time. It is supported by constant new developments, such as "green" materials. Moreover sustainable production is supported by the use of 3D technologies for the design and manufacture of clothing and footwear. Especially in the footwear industry, where the environmental performance is the worst, these technologies can increase the environmental friendliness of production and achieve a more perfect form of the product, capable of recycling or disposal. Disadvantages of traditional method as CNC milling as high cost, presence of waste, can be replaced with 3D printing technology, which results advantageous especially for small quantities of productions and complex shapes of personalized soles.

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