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ITMA 2023 -Shaping the Future: Digital Transformation in the Fashion Industry from Design to Consumer Experience

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1. Introduction

The textile industry holds significant importance to all countries in the world, from small to large, from developing to developed. By providing products to meet human beings' basic needs for clothing, the textile industry is one of the oldest industries in human history. Traditionally, the industry has been characterized as being labor intensive with low technological requirements t. However, the once labeled "sunset" industry has been continuously growing, transforming, and revolutionizing with innovations in almost every aspect of the supply chain. The innovations in the industry can be mainly classified into the following categories: 1) advanced materials; 2) production efficiency via automation; 3) lean and sustainable supply chain management, 4) innovations in new product development, 5) digital technology in the design process, and 6) consumer-engaged product experience.

Being the world's most influential textile and garment technology exhibition, ITMA provides a venue for the industry to converge every four years to showcase the latest textile and garment processing technologies, machinery, and materials, promote collaborations, and forge partnerships. In June 2023, ITMA hosted1,709 exhibitors from 47 countries showcasing their latest textile technologies in Milan with a total attendance of 111,000 from 143 countries (ITMA2023, 2023). A great testimony of an enthusiastic and energetic textile community for a strong, thriving textile industry. Surely not "sunset"!

While a wide variety of cutting-edge technologies were showcased in the exhibition, this report particularly focused on the following companies who provide AI technologies and/or digitalization technologies to the fashion industry, as contained in *Chapter 15: Software and Automation* of ITMA2023's floor map. Particularly, a total of five companies are included in this report. Information for each company was provided by the company representatives at the exhibition, brochures obtained at the exhibition, and company websites. Companies in each section are described in alphabetical order.

2.1 AI-Enabled Design in the Fashion Industry

Artificial Intelligence (AI) refers to the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings (Copeland, 2023). Given the fact that the fashion design process is very much driven by designers' experience, learned knowledge, training, and inspirations, (i.e., human intelligence), AI-enabled design offers great potential in the

fashion industry. With the strong learning power, Al-enabled tools can create (sketch and prototype) clothing designs by using data such as images from the brand's previous offerings or from other designers, data regarding customers' tastes (color and style choices), and current fashion trends (Javid, 2023). AI-enabled design can help enhance design creativity and increase design efficiency. In the next three to five years, generative AI could add $150 billion, conservatively, and up to $275 billion to the apparel, fashion, and luxury sectors' operating profits, according to McKinsey analysis (McKinsey & Company, 2023). Described below are two companies that exhibited AI-Enabled design related software at ITMA2023.

2.1.1 Audaces (https://audaces.com/en)

Audaces is an Italian-Brazilian company, a provider of technological innovation to the global fashion industry. The company's vision is to be a world reference in innovative technology, reliable services, generators of value to the market. For over 30 years, Audaces has been developing technological solutions that accelerate fashion creation, development, and production. Audaces is present in more than 70 countries around the world, with more than 40,000 fashion professionals using Audaces solutions daily. Audaces' products are grouped into Audaces360 and Cutting Room 4.0.

Audaces360: Audaces360 provides a complete digital solution to the fashion industry, integrating the creative and productive steps from the initial ideation of the design to the presentation of the sample and lookbook to customers. Audaces offers three "Style" software, namely Isa, Idea, and Fashion Studio, to assist designers quickly and creatively in completing the ideation by drawing directly on a three-dimensional virtual mannequin. Audaces offers two "Development" software, including Digiflash and Pattern. While Digiflash enables designers to easily digitize their paper patterns, Audaces Pattern allows designers to develop high-quality and high-precision digital patterns. Marker and Supera are two "Production" software. By integrating AI technology, the combined software enables designers to make perfect marking with maximum savings in time and fabric. Shape-U and Audaces 3D are two "Sales" software. By utilizing 3D modeling technology, the combined software eliminates the physical prototype process, reducing both prototyping cost and time. It enables a purely virtual prototype development and approval process.

Audaces360 (https://audaces.com/en)

Cutting Room 4.0.: Cutting Room 4.0 is an AI supported system to enhance the efficiency and accuracy of the cutting process in the garment production process. There are seven different software targeting different aspects of the cutting process, including Audaces ICF, Linea, Pratica, Neocut Bravo Neocut SL, Jet Lux, Digiflash Device, and Digiflash XT Device.

2.1.2 MYTH.AI: (https://myth-ai.com/)
Owned by Myth Yapay Zeka ve Tekstil A.S, MYTH.AI was founded in 2020. MYTH has two offices, one in London and one in Turkey. The company's vision is to become the world's leading design and software company as an artificially based "state-of-the-art" product in personalized design products. With cutting-edge technology, the company aims to provide green and digital transformation to all sectors and meet the requirements of the 4.0 industry. The company targets sectors such as fashion, home textiles, metaverse, game design and packaging design.

MYTH Generative AI Design Technology (https://myth-ai.com)

MYTH.AI provides two options for their designer customers to create their new pattern designs: Designers & Enterprises and Professional Model. While not much detail is provided, both options can generate unique patterns and 3D visual models customized for their customers' main products, eliminating physical workflow, and increasing productivity. Using the AI Designer, MYTH can make the pattern design process much quicker and easier. The company claims that MYTH.AI can help cut the design processes by 70 percent, with cost savings accordingly.

2.2 Fashion Digitalization with 3D Modeling Technologies
Digitalization is defined as the use of digital technologies to change a business model and provide new revenue and value-producing opportunities (Gartner). The fashion industry is in the process of embracing digital transformation with applications of 3D Modeling Technologies in its design, communication, marketing, and consumer engagement. With the changing landscape in the fashion industry, especially after the Covid-19 pandemic, digital transformation is not only important, but indeed pivotal, for brands to stay aligned with their consumers, who are busy and powered with digital technology (Lay, 2018). A more digital future is ahead of the fashion industry.

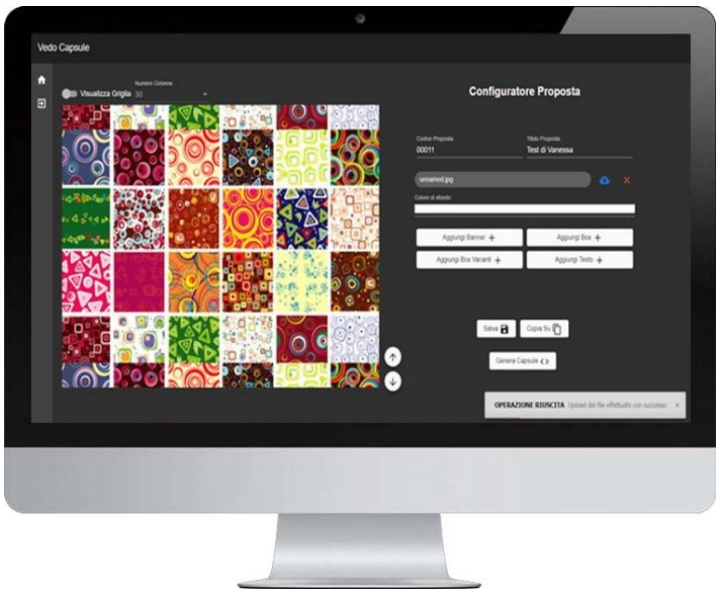
The very fundamental part of digital transformation is the digitization of products, both in the process of product development and product presentation to customers. A wide variety of 3D technologies are available in the industry, including the widely known Adobe Illustration, Clo, and others. Over the years, more new and advanced 3D modeling technologies/software emerged in the industry. The following companies exhibited at ITMA2023.

2.2. 1. Bottinelli Informatica (http://www.bottinelliinformatica.it/en/)

Bottinelli Informatica is an Italian Software house visioned to translate the difficulties of companies into innovative digital solutions. Founded in 1984 in Como, Italy, Bottinelli Informatica has been working with the textile and fashion industry for almost 40 years. The company offers customized software solutions, supporting customers from the design and analysis of processes, the development of the application, up to the assistance of operators.

Bottinelli offers four main products as described below:

Vedo Suite. It is a multimedia cataloging software that integrates highly customizable search functions with the possibility of gathering, organizing, and structuring different types of archives of images, drawings, books, etc. by categories and functional criteria to the needs of each user. It provides a cloud-based platform for managing and enhancing customers' digital assets. The software allows to 1) create 3D simulations of manufactured products starting from drawing, 2) revitalize historical archives and make them searchable, 3) create moodboards directly from the archive and share with collaborators or customers; and 4) safekeep design files; and 5) communicate and collaborate with partners and customers in the design process.



Vedo Suite enables customer input in the design process (Bottinelli Informatica S.r., n.d.)

Venus: Venus provides a tool for complete management of the production process from weaving, printing, finishing, to quality control. It allows companies' ERP to communicate with all processing departments.

Opla. Is an ERP management software, designed for the various facets of the enterprise, including salesforce, production, logistics, and finance.

Jacq Suite. The software is a tool for complete management of textile designs, both in the phase of communication and transfer in the supply chain, and for cataloging or sending for Jacquard or rat to production looms.

2.2.2 NedGraphics™ (https://nedgraphics.com/)

Founded in 1980 in Netherland, NedGraphics is a provider of textile design and CAD software solutions for the apparel, home furnishings, flooring and other textile

markets. With a strong presence across the globe, the company has worked with thousands of companies in the industry.

NedGraphics Fashion Design software is available in the following modules:

Creative: NedGraphics' Creative Design applications provide all the tools needed to create professional designs for printed, knitted, woven fabrics or carpet and tuft products.

Prints: Create and color beautiful, printed fabrics for apparel, retail and home furnishings using NedGraphics' software solutions specifically designed for the fabric and textile industries.

Woven and Knits CAD: Creating woven and knitted fabrics for apparel and home design with NedGraphics' Dobby, Jacquard, weaving and knit CAD/CAM software. Even the most complex woven fabrics can be designed, colored, estimated, calculated, simulated and sent straight to the looms.

Color: Streamline the entire color management workflow for apparel and retail, home furnishings and flooring designs with NedGraphics' coloring and calibration solutions. Quickly recolor designs with Easy Coloring Pro and ensure accurate color matching from monitor to production with NedGraphic Calibration.

Visualization: Create beautiful, professional customer presentations, storyboards, line sheets, product collections and catalog pages using NedGraphics Storyboard and Cataloging Pro, see true to life simulations of your fabric's texture and weave with Virtual Sampling and show buyers the final product without producing a physical sample using Easy Map Creator Pro.

NedGraphics provides dedicated tools for print, woven and knitted fabric design, carpet and tuft, color management and calibration, merchandising and more. The company claims that realistic 3D fabric simulation offers dramatic cost savings in sampling and can be used for commercial product presentations.

NedGraphics' Texcelle Solutions for Jacquard (https://nedgraphics.com)

2.2.3 Style3D: (https://www.linctex.com/)
Founded in Hangzhou, China in 2015, Style3D is a digital solution provider for the fashion industry. The company has R&D centers in China and the US. While many of their earlier customers were large brands in China, their customer base has been extended to thousands of global fashion companies across Europe, North America, and the Asia Pacific region (Style3D website).

Style3D provides a complete digital solution for different businesses in the fashion industry. According to the company, they provide four core products as described below:

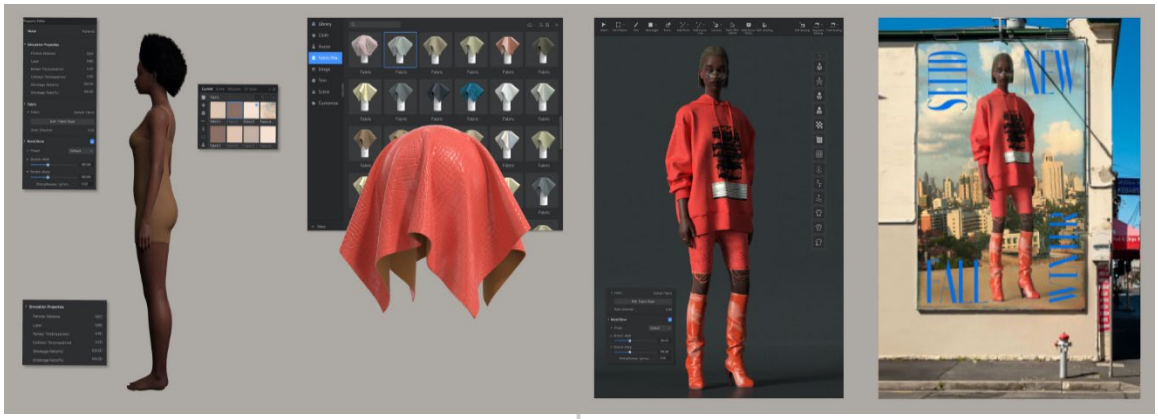
Style3D Studio: As the name indicates, it is a digital design software, which provides all the tools needed for design in a virtual space, from image rendering, pattern making, trims, accessories, materials, stitching, sampling, and fitting with avatar.

Style3D Fabric: This software provides a one-stop solution regarding fabric in the design process, including virtual fabric scanning and physical property measurement devices, digital fabric processing software, and cloud-based collaboration between suppliers, designers and brand.

Style3D Cloud: Style 3-D Cloud is a cloud-based digital collaboration tool that meets the needs of the entire industrial chain from 3D light design, pattern review, 3D alteration, cloud-based workflow, product display, and virtual merchandising to cross-function asset utilization. It provides a virtual collaboration and communication platform for all the members involved in the supply chain.

Style3D Marketplace: Style 3-D Marketplace is a 3D digital asset bank with tens of thousands of actively updated digital assets dedicated to different fashion fields from design, and pattern making to NFT, Metaverse, or marketing content creation.

From fabric measurement, simulation design, design review, online modification, to visual effect display, these digital products provided by Style3D bring great benefits to all members of the fashion business, including brands, ODMs (Original Design Manufacturers), and fabric suppliers. Comparable alternatives of Style3D include NedGraphics Fashion, Clo, Talornova, and Pointcarre. Among them, NedGraphics Fashion also exhibited at ITMA2023 and was included in this report.



From Design To Market with Style3D (https://www.linctex.com/)

3.0 Conclusions

This report includes five companies who exhibited at ITMA2023 to showcase their innovative digital technologies to the fashion industry. While each of them has their own focused areas (in terms of products and target market), they all share several common concepts, including digitalization, collaboration, sustainability (in terms of saving time and cost), and efficiency. These concepts perfectly reflect the main goal of Industry 4.0 to improve the efficiency of the manufacturing process by integrating robotic systems, the Internet of Things (IoT) and the use of Big Data analytics. However, the integration of Artificial Intelligence and 3D modeling virtual technologies enables easy and quick modification of the production process based on customer inputs or real situation change, hence making the process more human centric and resilient. Additionally, AI and virtual technologies further enable saving of time and material as a result of virtual prototyping and the CGI (computer-generated image) process.. With a focus on efficiency, sustainability, resilience, and human involvement, Industry 5.0 is fast approaching and will revolutionize the

production process. In the fashion and retail industry, the market is saturated with new and established brands, and consumers are more demanding, empowered, and experiential- oriented than ever before. Fashion and retail companies must embrace these emerging technologies to face the next stage of industrial development.

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