Clothing and Textile Technologies

SPECIALIZED TECHNOLOGY TRENDS in the textile industry—virtual fitting rooms, smart socks, wearable electronic devices, and 3D printed fabrics—are becoming more common. Most clothing and textile careers require the use of technology: creating and printing fabrics, fabric chemistry, textile conservation, fashion design, and smart clothing. Of the smart clothes and wearable technologies pictured here, which ones would you wear?

Which one of the smart clothes and wearable technologies would you wear?

Objective:

Identify clothing and textile technology trends.

Key Terms:

3D printing
computer-aided design (CAD)
computer-aided manufacturing (CAM)
clothing and textile arts
digitizing
digitizing tablet
e-textile
embroidery machine
flatbed scanner
grading
JPEG
pen drive
robot
sewbot
smart clothing
software
technical textiles
technology
textile
thumb drive
USB flash drive
wearable technology

Textile Technologies Trends

Technology is the application of specific mechanical or scientific knowledge for practical purposes. In other words, technology is the use of tools, devices, methods, and techniques to solve problems, or to enhance a product. The clothing and textile industry has embraced the latest computer technology.

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TEXTILES

A **textile** is any woven, knitted, knotted, or non-woven fabric. **Technical textiles** are fabrics used for industrial purposes, often chosen for characteristics other than appearance. For example, technical textiles are used for bulletproof vests, tactical clothing, outdoor furniture, umbrellas and awnings, flags and banners, sports fabrics, etc. The **clothing and textiles arts** are the design, manufacture, and marketing of clothing, footwear, accessories, interior fabrics, and technical textiles. This includes weaving, dyeing, printing, pattern making, and sewing.

FIGURE 1. Technical textiles are used for bulletproof vests, tactical clothing, outdoor furniture, umbrellas and awnings, flags and banners, sports fabrics, etc.

COMPUTERS

Computers in the textile and clothing fields are used for a wide variety of functions and tasks: apparel design, digital fabric designs, modeling and simulation, weaving, embroidery, cutting, sewing, defect analysis, 3D body scanning, etc. The Internet has enabled communication between designers, manufacturers, and marketers.

Software

Software is a set of instructions or programs that provides the information to direct the operation of a computer. Typically, the software comes with the documentation about how to install or how to use the software. Software programs are used in clothing and textiles design, production, advertising, merchandising, marketing, etc.

CAD

Computer-aided design (CAD) is software used to create precision drawings, technical illustrations, or models according to specific industry or company standards. CAD can be used to create, modify, and enhance a design. CAD software increases the productivity of the designer while improving the quality of design. Most companies use a computerized grading process today with the use of CAD systems. **Grading** is the process used to increase or decrease the sample size, by using each company's own grade specifications, or rules. For example, a size 10 pattern would be adjusted to create larger sizes, 12, 14, 16, etc. and also smaller sizes, 8, 6, 4, etc.

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CAM

Computer-aided manufacturing (CAM) is technology that uses computer software and machinery to facilitate manufacturing processes. The CAD application software can be directly imported into computer-aided manufacturing software (CAM) to create products. Manufacturing processes (such as spreading, cutting, and sewing) are made more efficient through the use of CAM.

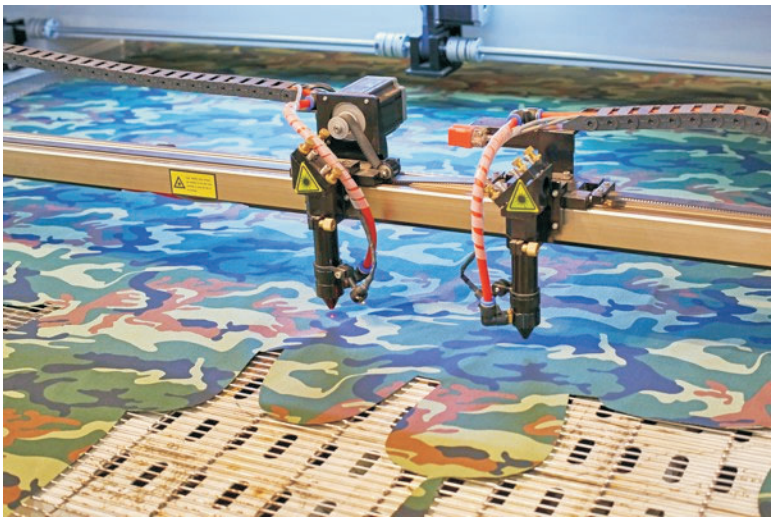

FIGURE 2. A laser speeds-up the manufacturing process by cutting multiple layers of fabric at one pass.

Flash Drive

A **USB flash drive** (also known as, a **jump drive**, a **pen drive** or a **thumb drive**) is a portable flash memory device that plugs into a USB port. A flash drive allows the transfer of materials or content from the Internet. For example, in embroidery designs, flash drives are used to share embroidery designs for use on the embroidery machine. Data can be stored and retrieved from various locations.

Scanner

A **flatbed scanner** is an electronic device used to save images of existing documents/pictures/objects into a file for later use. You can use the scanned images with embroidery digitizing software, and other clothing and textile software programs.

JPEG

A **JPEG** is a compressed image or graphic file format. A technical sketch of a garment or project can be saved as a JPEG and imported into different machines.

TEXTILE TRENDS

Textile trends include embroidery digitizing, layout models, CAD/CAM, pattern software, 3D printing, wearable technology, and nanotechnology.

Machines

Machines can perform specific tasks, according to the directions given to them by the computer software.

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Robot

A **robot** is an automated machine that can perform basic fabric handling, and can "pick and place" materials.

Sewbot

A **sewbot** a piece of equipment that executes direct stitching tasks with little distortion. Adidas owns a "speedfactory" in Germany designed to increase the pace of the supply chain. The company projects a speedfactory could produce 500,000 pairs of shoes annually.

Embroidery Machine

Embroidery is thread art (lettering, monograms, designs) that embellishes a garment, hat, or other clothing or object. An **embroidery machine** is a computer-driven machine that moves a pantograph (a part of the machine that moves the hoop to form the pattern) with hooped items in various directions to form different stitches. These computerized sewing machines use microprocessors to embroider and make the small decorations. The digitized software program controls each movement of the machine. Embroidery machines can be single- or multiple-head tools with multiple needles per head. Embroidery and computerized sewing machines usually require training for the operator. These machines:

- Offer pre-programmed patterns and memory cards
- Allow patterns and designs to be downloaded from the Internet
- Use a loop embroidery feature
- Create personalized products

FIGURE 3. Embroidery machines use a loop embroidery feature, and create personalized products.

Embroidery Digitization

Digitizing is a computerized process that converts artwork into a series of commands read by an embroidery machine's computer. A **digitizing tablet** is a CAD device used by the digitizer to plot needle penetration for embroidery designs. In short, a pencil sketch is enlarged and taped to the tablet. Then, the digitizer's mouse selects stitch types, shapes, underlay, and needle penetration.

Layout Models

CAD software (such as *AutoCAD* and *Digital Fashion Pro*) allows fashion and pattern designers to create layouts for garment and accessory pieces. A technical sketch of a customized gar-

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ment is saved as a JPEG and imported into the CAD templates. The software allows the operators to see the design as a digital image, to scale (proportion) the pieces, and to set the dimensions on the computer. The software saves tailoring and altering time, and allows for colors and fabrics to be selected after viewing the virtual models.

CAD/CAM

These application programs are used to design products and to program various manufacturing functions. For example, *OptiTex*, a popular software program, offers solutions that cover the entire design process including:

- Product Development: *ODev* perfects garments before cutting or sewing.
- Production: *OPro* reduces material costs and waste during production, ultimately saving time, money, and resources.
- Sales Showroom: *OSel* allows online customers, buyers, and merchandiser to view and buy clothing with 360° photorealistic designs.

Pattern Software

Patternmaking software programs include *Gerber* and *Red Tree*. Industry pattern software helps decrease production costs by organizing the pattern pieces and sewing steps. Using an individual customer's body measurements, the software uses a 3D manikin to customize a garment's color and fabric.

3d Printing

3D printing is an additive manufacturing process that creates solid objects based on instructions in a digital file. 3D printers create fabrics, tiles, rugs, shoes, accessories, etc. by laying down successive layers of seamless material until the "fabric" is created. Many unique designs are found in high fashion, and in the printing of sports shoes. *Forbes* magazine predicted that 3D printing will be a $5.2 billion industry by 2020.

FIGURE 4. 3D printers can create 3D wall coverings for the interior design industry.

Wearable Technology

Wearable technology is electronics worn on the body as an accessory, or as part of a garment's fabric.

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E-textile

An **e-textile** is the use of electronics in fabrics/textiles: sensors, batteries, LEDs, etc. E-textiles are not necessarily worn on the body. Some are fabrics for upholstery, window treatments, and other decorating tasks. Examples include activity trackers, Smart watches, and Smart clothing.

Smart Clothing

Smart clothing is an adaptive garment that is connected to the wearer electronically. Smart textiles come in two types: aesthetic (visual, artistic) and performance enhancing. Aesthetic fabrics may light up or change color. Performance-enhancing textiles are often military- (bulletproof) or athletic-focused (reduce wind resistance or regulate body temperature). For example, smart clothing may sense when the wearer is warm and release chilled water vapor, or the clothing may sense when the wearer is cold and heat up accordingly. A wearable sock can use artificial intelligence to gauge an athlete's gait, in order to choose the most suitable footwear to minimize injury. A wearable heater, created by modifying Kevlar® fabric with nanowires, can conduct and retain heat (especially for joint injury and disease).

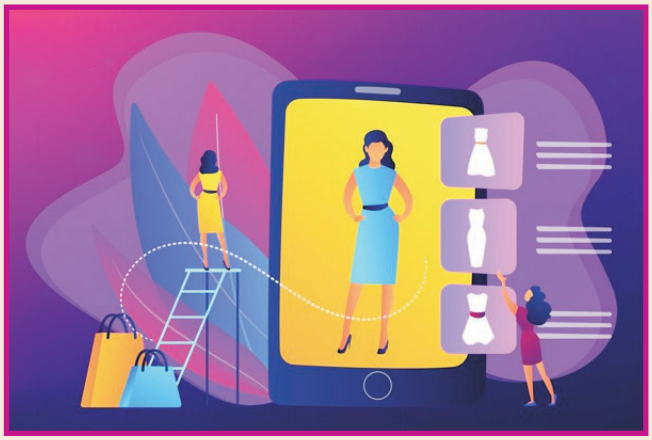
Nanotechnology

Nanotechnology (tasks at the microscopic level of individual atoms and molecules) treatments are coatings that cover individual fibers and threads. In terms of clothing and textiles, nanotechnologies have created water- and soil-resistant clothing, odor-less socks, and intelligent clothes that help individuals perform climate control.

FURTHER EXPLORATION...

ONLINE CONNECTION: Wearable and Virtual Technologies

Wearable technology is predicted to play a major role in the future of the fashion industry. Read the Wareable website article, "Fashion Tech: 20 Wearables That Are More Chic Than Geek," at https://www.wareable.com/fashion/wearable-tech-fashion-style. Then, access the FitNect website to visualize virtual dressing room options. Poll your classmates about the wearable products most used and discuss the impact of these products on the fashion industry and about their use of virtual dressing rooms.



Do virtual dressing rooms reflect an accurate fit?

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Summary:

Advances in the clothing and textile industry are tied to technology: technical textiles, 3D printing, embroidery machines, scanners, robots, and sewbots have improved both quality and quantity. CAD/CAM programs and patternmaking software increase the efficiency and effectiveness of the entire design process. New practices and products have a major impact on the fashion industry. However, to take the best advantage of all the new technologies, you need to understand and demonstrate the abilities to produce sketches and technically-adept sewing: computers rely on your input—scale, proportion, and effective layout are assisted by the computer, but design, style, and innovation is entrusted to humans.

Checking Your Knowledge:

1. What are technical textiles? List four examples.
2. What are wearables? What are e-textiles?
3. What are three advantages of an embroidery machine?
4. How does digitizing work?
5. Predict the impact of 3D printing on fashion and textiles.

Expanding Your Knowledge:

Think about how you have used technology in your clothing and textile courses. List three examples of assignments or projects that required you to use technology. Describe one project.

Web Links:

3D Sketches / 3D Printing
https://style2designer.com/apparel/designing/3d-sketches-3d-printing/

Fashion and Design Software
https://www.capterra.com/fashion-design-and-production-software/

The New School Parsons
https://www.newschool.edu/parsons/

What is CAD-CAM in Fashion Industry?
https://style2designer.com/pattern-cutting-cad-cam/cad-cam/

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