

Introducing Digitizing Technology in CAD Pattern-Making Class for Upcycling Project

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Background. Computer-Aided Design (CAD) software can be used for full digital creation of apparel patterns, digitization and modification of existing patterns, as well as innovation in manufacture. Digitizing is the process of transferring paper patterns into a digital computerized format via scanning procedures (Harlock, 1989; Stott, 2012). Low-technology based procedures can be used for digitizing patterns utilizing traditional scanners and manual tracing of patterns within a computer program, such as Adobe Illustrator (Plummer, 2015 & 2016). However, specialized software developed by industry leaders in CAD, such as Optitex, Lectra, and Gerber, provides enhanced efficiency and accuracy in the digitization of patterns. Such advanced software requires installation of specific programs for digitizing as well as an interactive digitizing table and mouse. Digitizing technology has been used for the development of innovative designs within both academia and industry. The digitizing process allows designers to thoughtfully engineer design placement and construction with precision and accuracy (Hwang & Zhang, 2015; Saeidi & Korani, 2017). This technology has risen in popularity within the apparel and textile industries due to the demand for precision, speed, and enhanced design capabilities for the shift to technology-based design.

Sustainable Design in Higher Education. Environmental effects of manufacture and the concept of sustainability are a growing field of concern in the apparel and textiles industry. To better prepare the design students, universities must implement course curricula that discusses environmental issues while providing tools for the incorporation of sustainable design to the future industry members. Students must adopt the mentality that it is the responsibility of the designer to consider sustainable design principles and practices when creating the concept for a new ensemble; accordingly, educators need to reinforce the concept with tools and teaching strategies. Instead of simply addressing sustainable issues in design courses as a mere suggestion for students to consider in their projects, it is pertinent that educators stress the necessity of eco-friendly practices and have students understand sustainability as a mandatory aspect of design. According to Gwilt (2014), there are seven strategies designers can utilize to reduce the environmental impact in the design or production stages: (1) minimizing the consumption of resources, (2) choosing low-impact processes and resources, (3) improving production techniques, (4) improving distribution systems, (5) reducing impacts created during use of materials, (6) improving a garment's lifetime, and (7) improving the use of end-of-life systems. To promote students' minimal consumption of resources, educators can inform students of methods such as the reconditioning of already made materials or upcycling of used materials and garments.

Implementation. Lectra Modaris, a digital pattern-making software used for all phases of pattern development, was implemented into the required coursework within the university’s junior-level CAD pattern-making class. The Modaris software provides designers with a virtual method for pattern manipulation, drafting, and grading. Once students learned the major contents of using the software, digitizing technology was introduced. The students were then required to apply digitizing technology in their design process for the first project, which upcycled second-hand (SH) garments or materials into a new ensemble. Students were encouraged to revamp pre-existing clothing from thrift stores or personal wardrobes into new sustainable designs. The reduction of textile waste was a necessary consideration when creating a garment from scratch from upcycling and digitizing methods. This consideration allowed students to accomplish minimized resource consumption and thoughtful design. As a preliminary method, the instructor introduced a design process model suitable for the upcycling design project. The model involved sourcing the fabric at the beginning rather than starting from sketch drawing as upcycled design and construction relies heavily on the availability of materials. The design and production process and teaching methods are demonstrated in Figure 1.

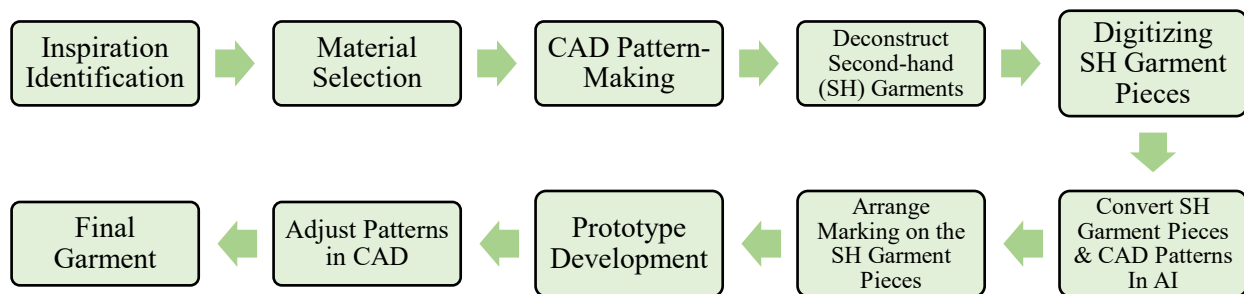


Figure 1. Production process using CAD and digitizing technology on upcycling design project.

At the *Digitizing SH Garment Piece* stage, students were required to iron the deconstructed garment pieces flat and digitize each single piece into the software for conversion into Adobe Illustrator. According to their design and pattern-making perspectives, the existing garment pieces may have required connection via seams to fit the final pattern layout created in Modaris. Once the garment patterns were finalized and seam allowances added, all pattern pieces were converted into Adobe Illustrator. The garment patterns were laid out inside of the digitized existing garment patterns and arranged marking based on the grain line. One student’s work, shown in Figure 2, shows the deconstruction of the SH knit T-shirt and its digitization into Modaris then conversion into Illustrator. The existing garment patterns were colored in grey, and the final garment patterns were in white.

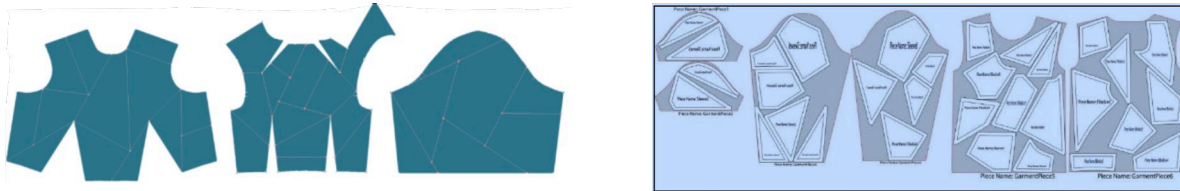


Figure 2. The final garment CAD patterns (left) and pattern marking (right) on the SH garment pieces.

Conclusion. The benefits of applying CAD pattern-making and digitizing technologies into the upcycling project in the design studio class are: (a) to make necessary pattern adjustments and save the model for improved ease of access later, (b) to add seam allowances on the garment patterns more quickly and more accurately than the traditional paper pattern-making method, (c) to simplify the evaluation of the size and usage of existing SH materials before constructing the final garment, and (d) to enable easy arrangement of the marking of the garment patterns onto the existing SH materials to achieve the minimal waste goal for the sustainable apparel design project.

References:

- Gwilt, A. (2014). *A practical guide to sustainable fashion*. New York: Fairchild Books.
- Harlock, S. C. (1989). Prospects for computer integrated manufacture (cim) in the clothing industry. *International Journal of Clothing Science and Technology*, 1(2), 17–24. <https://doi.org/10.1108/eb002947>
- Hwang, C., & Zhang, L. (2015). Carving a rose window. *International Textile and Apparel Association (ITAA) Annual Conference Proceedings*.
- Plummer, B. (2015). Digital Dilemma. *International Textile and Apparel Association (ITAA) Annual Conference Proceedings*.
- Plummer, B. (2016). Digital Dilemma II. *International Textile and Apparel Association (ITAA) Annual Conference Proceedings*.
- Saeidi, E., & Korani, T. (2017). Fusion of Culture and Technology. *International Textile and Apparel Association (ITAA) Annual Conference Proceedings*.
- Stott, M. (2012). Digitizing a clothing pattern on Lectra Modaris pattern cutting software. *In Pattern Cutting for Clothing Using CAD*. Woodhead Publishing. Philadelphia, PA: Woodhead Publishing.