Lenticular Flow

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As one type of the transformable garments, modular designs feature small components that can be worn independently or replaced with other components, thus creating an endless number of combinations for different looks (Koo, Dunne, & Bye, 2013). With the concept of modularity, it is possible to change pieces of a design without redoing the whole therefore extending the garment's life span. As a concept, modular design has been explored by textile and apparel designers. For example, fashion Designer Kosuke Tsumura created cocoon shape garments using individual sonic-cut units with materials that he invented called Felibendy (Mini, 2009). The Fragment Textiles designed by Soepboer and Van Balgooi developed two small wool forms, squares and stars, which were assembled to create a textile (Stam & Eggink, 2014). However, most designers who explored modular textile and apparel designs, such as those of Kosuke Tsumura, Soepboer, and Van Balgooi, focused on two-dimensional products or more boxy silhouettes that did not contour closely to the body since most of their works were made from modular shapes of one size. There was also little information about the methods of developing more fitted garments with the modular concept. Previous studies have explored the use of modular pieces to create wearable art pieces (XXX & XXX, 2018). This research continued this exploration with specific focus on creating modules that can be used to create fitted garments combined with digitally printed fabric for dynamic and changeable surface design.

To investigate the concept of modularity in apparel design and explore the possibilities of creating fitted garments allowing more modular design options, the researchers focused on creating one modular garment based on a triangle shape to test out the effectiveness of the design research. The triangle shape idea was inspired by one of the classifications of modular designs, known as geometric modules, which was created by Li, Chen, and Wang (2018). These geometric modules used shapes such as a triangle, quadrangle, or polygon to form the textiles and garments. By combining the basic modular shape with inspiration from aquatic life, the

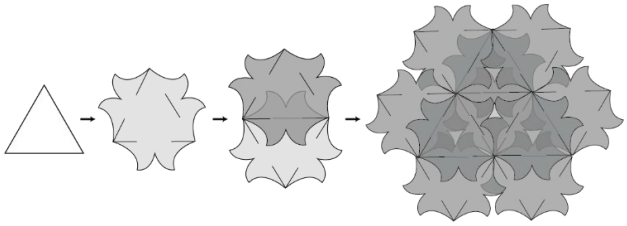

Figure 1. Module Design I developed from a triangle and its interlocking method.

purpose of this design research was to develop methods for apparel design allowing for the creation of fitted garment constructions, as well as continue exploring the use of modular pieces as closures to join other fabrics to elevate the design potential of modular garments. The silhouette for this design was set to be a fitted torso dress for women since the goal was to create garments that were fitted and shaping is more pronounced on a woman's body.

The process started by developing the module based on a triangle shape. Using inspiration from aquatic life, tail fin outlines were created on the triangle shape in Adobe Illustrator and functional cutouts were added on each of the three tails for joining. Figure 1 represents the tail fin module, Module Design I, created from a triangle shape. The modular shapes could be interlocked together through the slots on the sides to create a textile (Figure 1). After the Module Design I was developed, methods of creating fitted garments were explored. For fitted garments, the shape of the body at the front, as well as the sides, needed to be addressed in the pattern including chest, waist, and hip measurements (Anand, 2011). Therefore, the first method was to gradually increase the size of the modular shapes to fit the three measurements of a dress-form at the same time making sure the slots were still functional. The second method was inspired by the use of darts on traditional pattern pieces especially around the bust. Since darts are used on flat fabric to take in ease and provide shape to a garment, a modified modular shape was engineered on Adobe Illustrator to take the corresponding eases out while keeping the same outer designs (Figure 2). Once the two methods were developed and tested on paper, the researchers then selected the final fabric to complete the designs. The Module Design I was hand-cut on lenticular fabric in four different sizes, based on the method one discussed above, which provided dynamic 3D effects simulating the shimmer and movement of fish scales. Those modular shapes then joined together through the slots on the sides to create the torso of the dress. The special modular shape developed from method two was used on the dress at the bust area to take in ease.

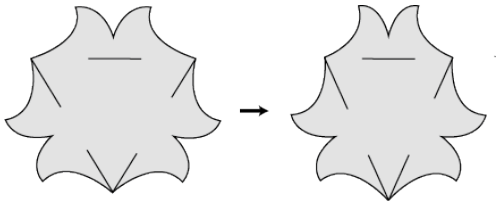

Figure 2. A modified modular shape (right) developed from Module Design I (left).

To complete the dress and achieve the second goal of this design research, a new module was developed serving as a closure to combine with digital printed fabric for dynamic and changeable surface design. As demonstrated in figure 3, the edge of the Module Design I was used as the inspiration for the Module Design II. Once the set of the shapes were developed on Adobe

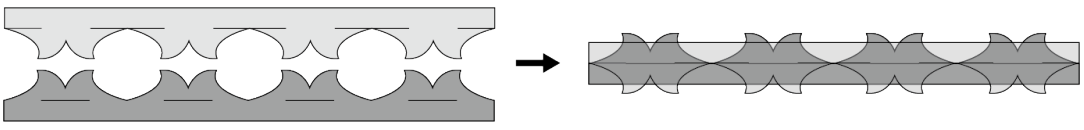

Figure 3. Module Design II (left) and their interlocking method (right).

Illustrator, they were then transformed and hand-cut on the same lenticular fabric for later use. For the skirt, the pattern was first drafted on Optitex, including a half circle skirt divided into ten panels. They were then transferred into Adobe Illustrator to add print. The finished print was digitally printed on a silk dupioni fabric. After the fabric was printed and cut out, Module Design II pieces were machine sewn on the edges of each silk dupioni piece. The skirt was formed by the use of Module Design II pieces interlocking together, therefore, the printed designs on the skirt are interchangeable to represent ocean depths with different surfaces, which can be rearranged to be shown as a black print, blue print or alternating print. Additionally, since the Module Design II had the same tail fin shape as Module Design I, they were joined at the lower waistline to complete the dress.

The modular concept allows the researcher and wearers to create endless variations on a single garment. For the Module Design I, used on the torso of the dress, each module piece can be reconfigured to create different looks without the use of a sewing machine. By joining with the digitally printed skirt panels, the Module Design II idea increased the versatility of the surface design. By providing wearers more options with one single garment, this module design has the potential to be sustainable by extending the garment's life span and therefore minimizing waste. Furthermore, two methods were developed for the use of modules on fitted garment construction which could contribute to the use of modular systems on apparel design.

References

Anand, N. (2011). Pattern Engineering and Functional Clothing. *Indian Journal of Fibre & Textile Research. 36*(4), 358-365.

Koo, H. S., Dunne, L., & Bye. E. (2013). Design functions in transformable garments for sustainability. *International Journal of Fashion Design, Technology, and Education*, *7*(1), 10-20.

Li, M., Chen, Y., & Wang, Y. (2018). Modular design in fashion industry. *Journal of Arts & Humanities, 7*(3), 27-32.

Mini, M. (2009, May 12). Kosuke tsumura: Cocoon cradle and mother piece for tokyo fiber 09 senseware. *Design Boom.* Retrieved from https://www.designboom.com/design/kosuke-tsumura-cocoon-cradle-and-mother-piece-for-tokyo-fiber-09-senseware/

Stam, L. & Eggink, W. (2014). How to interest people for the hare instead of the chase, an exploration of open script design to change consumer behaviour. In Y. K. Lim, K. Niedderer, J. Redström, E. Stolterman, & A. Valtonen (Eds.), *Proceedings of the annual Design Research Society conference (DRS); Umea Institute of Design (Sweden); 16-19 June 2014; Design's Big Debates (pp. 1535-1547).* Umea, Sweden.

XXX, & XXX, (2018). XXX, *International Textile and Apparel Association (ITAA) Annual Conference Proceedings*, XX. Retrieved from XXX.