

Lots of Dots – a gradable zero-waste plus size dress

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Contextual Review and Concept: The United Nations Environment Programme (UNEP) recently released *Sustainability and Circularity in the Textile Value Chain: A Global Roadmap* (United, 2023) identifying three priorities for achieving its goal of circularity. Within the second priority, improved practices, “designs optimizing efficiency such as minimizing fabric cut-out” (United, 2023, p. 48) is indicated as one way to minimize impact. Zero-waste fashion designs focus on creating a pattern layout for the garment(s) that leave no scraps (fabric cut-out) behind once the garment has been cut (Rissanen & MCQuillan, 2016). The importance of zero-waste designs was underscored by a webinar produced by the Council of Fashion Designers of America in April 2023 titled Zero Waste Design (Council, 2023). In the webinar, Shelly Xu emphasized how zero-waste patterns can be much more efficient in their fabric usage than traditional patterns, resulting in considerable cost savings for manufacturers, in addition to minimizing their environmental impact.

While some zero-waste patterned garments exist on the market, most are not offered in robust size ranges (Carrico, et al, 2022). McKinney, et al (2020) surveyed 64 patterns for zero-waste apparel and found that most were constrained to a single garment size. If apparel brands want to meet the UNEP goal outlined above, they will need to integrate zero-waste patterns into their apparel lines. One obstacle to that integration is producing the garments in a range of sizes that meets the needs of diverse consumers (Carrico & Kim, 2014; Rissanen, 2014; Saeidi & Wimberley, 2018; Carrico, et al, 2022). I have been working on zero-waste designs for more than ten years, and I enjoy how the “roles of designer and patternmaker unite in a holistic approach to creating garments, considering aesthetics and function simultaneously” (Carrico & Kim, 2014, p. 58). Additionally, I want to eliminate the obstacles to producing zero-waste garments for apparel brands.

The purpose of making *Lots of Dots – a gradable zero-waste plus size dress* was to validate the application of a recently published method for grading zero-waste garments (Carrico, et al, 2022) to a plus size women’s dress. The publication and subsequent exhibited designs by the authors feature applications of a grading technique that preserves the original zero-waste pattern; strategically placed uniform bands of fabric or trim are inserted into seams to serve as a means for grading. The original zero-waste pattern is not altered, meaning if 4-ply of fabric are cut from the single pattern, four different garment sizes can be constructed by inserting different lengths and widths of bands. The grading method, though, has not yet been applied to a plus size garment where the increments between sizes are larger than between traditional “missy” (sizes 2-14) sizes. Additionally, the plus size women’s market is underserved, even though two-thirds of American women’s bodies measure as plus size (Hudson & Hwang, 2022), and research has

shown “that plus-size women are committed to purchasing sustainable labeled clothing” (Cervantes, 2022, p. 50).

Process, Technique, and Execution: This dress design was loosely based on a bog coat, an historical garment on which many contemporary zero-waste designs have been based (McQuillan & Rissanen, 2020). The pattern development for *Lots of Dots* occurred within Browzwear’s VStitcher, a 3D garment simulation tool. 3D design tools have been shown to be beneficial in zero-waste design workflows because “digital design tools can enable a more holistic approach to garment design which may provide space for waste reduction practices to occur” (McQuillan, 2020, p. 91).

Since the desired outcome was to make *Lots of Dots* in a range of sizes, the measurements of avatars in VStitcher needed to correspond to sizes 1X through 4X. I collected measurements for sizes 14-30 from ten major brands’ online size charts in February 2023. The measurements were averaged and rounded to establish the size chart found in Figure 1.

Beyond the bog dress inspiration, the dress design was informed by existing research into plus size customer needs. Hudson and Hwang (2022) identified features of garments preferred by plus size female consumers: a majority of their participants preferred skirt lengths at the knee or above the knee, sleeve lengths at $\frac{3}{4}$ or full length, and fabrics printed with contrasting colors in geometric or floral designs. The sleeve length at $\frac{3}{4}$ worked well within the pattern layout, as did the skirt length at just above the knee level.

Size	1X (14/16)	2X (18/20)	3X (22/24)	4X (26/28)
Bust	42.5-43.25	45-46.5	48-50	53-55
Waist	37.25-38	39-40	42-44	47-50
Hip	44-46.5	48.5-50	52.5-55	57-60

Figure 1. Body measurements in inches used for the dress

Pattern shapes were designed and arranged simultaneously to create the zero-waste layout. The shapes of the dress patterns went through many iterations as the dress was visualized on the different sizes of avatars within VStitcher. A video showing the dress in four sizes with pressure maps can be viewed at <https://youtu.be/SdcnHxd9ZhE>. Negative areas within the pattern layout became pocket bags and facings. I intentionally made the bands (that allow for grading sizes) prominent design elements. The final zero-waste pattern layout is shown in Figure 2. The final design features vertical bands in the center front, center back, shoulders, and sides of the dress. Horizontal bands go across front and back chest areas as well as the waist. The collar is also made from a rectangular band of fabric. Inside the dress, bands also create casings for elastic at the sleeve hems and waist. To ensure drape compatibility and color consistency, all fabrics used in *Lots of Dots* were digitally printed on organic cotton sateen.

Aesthetic Properties, Visual Impact, and Cohesion:

The bands at center front and center back were deliberately divided to minimize the visual impact as the band widths varied across sizes. Dividing one wide band into three smaller bands was a successful strategy in Rougeaux-Burnes' (2021) *Gradable Zero Waste Outerwear*. Another strategy I employed to minimize the visual difference was to use printed fabrics throughout the dress. Mixed print garments can become visually complex, depending on the colors and print motifs. Seifert and Chattaraman (2017) found that a moderate level of complexity provided the highest pleasure.

Therefore, to keep visual complexity within an acceptable range for most consumers, the color palette was limited to black and white, and motifs were limited to circles, either filled or outlined. The monochromatic color scheme and use of circles create cohesion and unity.

Design Contribution and Innovation: *Lots of Dots* successfully validates the method for grading zero-waste garments (Carrico, et al, 2022), applying it to a new apparel category, plus size dresses. It is unique in the use of multiple printed fabrics to achieve the look. This design meets the plus size consumer's desire for sustainable apparel and presents a solution to offering zero-waste garments in a range of sizes. Future research can evaluate consumer acceptance of the design including aesthetic differences between sizes.

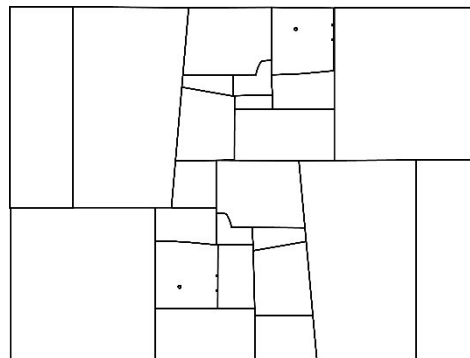


Figure 2. Pattern layout 54.25 x 41 inches

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