Zero Waste Design Exploration

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Introduction to Sustainability

The researcher was first introduced to the idea of sustainable fashion when reconstructing clothing a few years ago after a friend asked her to create a custom reconstructed flannel shirt for him. Gradually, others followed suit. Soon the researcher created upcycled clothing around the clock, selling one-of-a-kind pieces made from secondhand (donated/discriminated) materials. The researcher wanted to make a contribution to the sustainability movement by reusing clothing that was already in existence, with fits the description of upcycling. Upcycling is defined as the process of taking a post-production product and making something new out of it; thus, adding value to the product (Little, 2018).

As the researcher designed and sold new pieces, she also began to do increased research on the fashion industry and sustainability regarding textile waste and its impact
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on the environment and the economy. Throughout the years, the researcher has become more knowledgeable on sustainability and has made a point to keep sustainability in mind when designing pieces for her business. Making sustainably produced garments has been done by simply using secondhand materials, not new fabric. Using the design philosophy to reduce & reuse: the researcher has tried to reduce fabric production by buying secondhand materials whenever possible and has built a business that prioritizes reusing secondhand garments.

There is currently a significant push in the fashion industry for brands to contribute to a circular economy. The idea is to take products and materials that already exist and reuse them for other products of higher value (Little, 2018). This can is by both upcycling and recycling. Recycling differs from upcycling in that it involves breaking down existing materials to create a new material (Little, 2018).

The researcher's business has used upcycling to promote sustainability and attempt to contribute to a circular economy. Using materials that are already in existence reduces the carbon footprint because no new energy is needed to create raw materials. Upcycling and recycling are both industry trends that are helping to drive the sustainability movement in the fashion industry (Little, 2018). While upcycling has been an effective method in the researcher's business, a new approach to sustainability, the exploration of the zero-waste design, was used for this project.

Research

There are many ways to approach sustainability when it comes to fashion design. Specifically, for this project, the focus was on researching and testing zero-waste designs.
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Zero-waste design is the process of designing a garment that wastes essentially no fabric, using the entirety of a piece of fabric (Rissanen & Mcquillan, 2017).

The motivation for exploring zero-waste design is the issue of textile waste in the fashion industry. There are two main categories of textile waste: pre-consumer waste and post-consumer waste. Pre-conSUMER waste occurs during the manufacturing process of raw materials, and post-consumer waste is the waste produced after an individual uses a product, such as clothes that have been donated (Rissanen & Mcquillan, 2017).

In previous projects, the researcher's focus was on the issue of post-consumer waste. At the start of this project, while intending to focus only on pre-consumer waste, the end projects addressed both the pre- and post-consumer issues. The projects used secondhand fabrics as the raw material, initially making it a post-consumer waste. Additionally, the researcher designed the pieces to produce no waste; thus, avoiding pre-consumer waste generated from the garments.

Historically, because of the value of the fabric, a zero-waste mentality framed a garment's creation. An example of this is the Japanese Kimono, a design featuring eight different pieces cut from a single piece of cloth, sewn together to produce no fabric waste (Rissanen & Mcquillan, 2017). Zero waste designers take inspiration from this type of garment. Inspired by the boxy Kimono sleeves, the researcher featured them in two designs shown in this exploration. They are straightforward to achieve when striving for a zero-waste design because of the simplicity of the lines required to produce the sleeve.

The importance of sustainability is only increasing, and brands will have to continue to innovate to figure out how the industry can have less of an impact on the environment. The fashion industry alone generates 1.2 billion tons of greenhouse gasses
per year (Company, 2020). In current garment production, about 15% of the fabric goes to waste (Rissanen & Mcquillan, 2017). Globally, about 65 billion square yards of fabric go to waste each year (Rissanen & Mcquillan, 2017).

There are currently programs in place that chip away at this issue in other ways. For example, based in New York City, the company Fab Scrap collects industry scraps, and companies such as Waste Daniel purchase these scraps and use them for their products. Purchasing industry scraps is an excellent way to contribute to the sustainability movement. However, it would still be more effective to design garments that initially do not produce any waste.

Design Process: Creating Three Zero Waste Tops

Zero Waste Top One Creation Process

The first textile piece the researcher chose to work with was about a yard of a secondhand paisley satin. The researcher adored the pattern and the color and wanted to work with something she already had on hand. Again, she promoted sustainability by using something already owned, thus giving it new life so it would not end up discarded.
The fabric selected had a swatch cut out of it, so the first step was to cut off a strip of fabric to form a rectangle. The strip ended up being part of the asymmetrical waistband.

After separating the excess strip, the researcher folded the fabric, so it was now in fourths. Then, she cut a fabric segment out of the rectangle to create the arm and bodice.
Following the armhole and bodice separation, the researcher cut out the neckline and separated the bodice at the waist.
After unfolding the fabric, these are the pieces the researcher had to work with.

[Images of fabric pieces]

Figure 9 & 10: Armhole and side seams sewn

Next, the researcher sewed the underarm seam and side seams and laid out the leftover pieces to create a unique peplum-type bottom.

[Images of the peplum being created]

Figure 11: Peplum pattern created

The researcher used a combination of gathering and pleating when assembling the bottom part of the top to add extra interest to the whole top. This fabric manipulation created an attractive silhouette and added to the overall personality of the garment.
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Figure 12 & 13: Gathering sections of the peplum bottom

Figure 14 & 15: Inserting darts in other areas of the peplum
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Figure 16: Bodice assembled

After assembling the top and bottom parts of the bodice, the researcher decided to add ¼" bias tape to the neckline and, eventually, the sleeves.

Figure 17: Sewing bias tape along neckline

The bias tape was secondhand, which also promotes sustainability.

Figure 18: Band and leftover piece from neckline
At this point, the only pieces the researcher had left to use were the waistband piece and the circle leftover from cutting the neckline. Again, to add personality to the garment, she decided to do something unique with the waistband by cutting an opening into the garment, creating an asymmetrical space to insert the waistband.

Figure 19: Shirt front

Figure 20: Shirt back with segment cut for band addition

Figure 21: Band Inserted at top.

Figure 22: Band inserted completely
The researcher chose to insert the waistband in this way in order to add a little bit more ease to the top. The fabric does not have any stretch, and with the waist a bit too small to get over the head comfortably; inserting the waistband like this added visual interest and made the garment fit more successfully.

The final steps were finishing the hem, adding the bias tape to the sleeves, and creating belt loops out of the neckline excess fabric. As shown below, the garment can be worn in two different ways: with the belt tied tightly around the waist and tied around the belt loops in the front (top), or the waistband can be draped lightly for a more full, looser fit.
As shown below, the garment can be worn in two different ways: with the belt tied tightly around the waist and tied around the beltloops in the front (top), or the waistband can be draped lightly for a more full, looser fit.

Figure 24-28: Finished Top

Zero Waste Top Two Creation Process

For the second top completed as part of this exploration, the researcher found a piece of scrap shantung fabric measuring about a yard and a half. She thought this piece would be both interesting to work with and a challenge because of the unique cut of the scrap.
The researcher similarly began the process as the first top; by cutting out a section differentiating the sleeves from the bodice and cutting a hole for the neckline.
Next, long rectangular pieces were added to lengthen the sleeves and were sewed down.

**Figures 31 & 32: Section added to lengthen sleeves**

**Figure 33 & 34: Creating the bias tape for neckline**
After lengthening the sleeves, the researcher created a strip of bias tape to begin finishing the neckline. She left the ends of the tape hanging down and ended up adding interest to the neckline by cutting down the center and adding bias tape in the opposite direction.

Figure 37: Neckline slit cut down center front

Figure 38: Additional bias tape created about 3 inches
Figure 38: Bias tape added along center front division on left side

Figure 39: Bias tape inserted along center front division on both sides
Next, with four out of the seven pieces left, the researcher combined them to make rectangles. She then made these rectangles into cuffs for the sleeves.

Figure 40: Remaining pieces leftover
Figure 41: Assembling cuffs

Figure 42 & 43: Gathering ends of sleeves and attaching cuffs
The researcher gathered the edge of the existing sleeve before inserting it into the cuffs to create a bishop sleeve.

*Figure 44: Rolled hem pinned*

Next, the hem was finished using the double roll technique, which is folding the raw edge up twice to create a nice smooth edge.

*Figure 45 & 46: Assembling scraps to create patch pockets*
With the final scraps, two unique patch pockets were created.

Figure 47: Patch pockets finished and pinned

Figure 48: Leftover pieces
These are the small pieces leftover from the design process. Since it is such a minuscule amount, this top is still considered zero-waste.

Figure 49: Finished top front

Figure 50: Finished top side

Figure 51: Finished top side

Figure 52: Finished top back
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Zero Waste Top Three Photos

Figure 55: Finished top side
Figure 56: Finished top front tied
Figure 57: Finished top back untied
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The researcher started the third top using a yard of a 55% linen, 45% cotton blend for the third top. She began by cutting a hole for the neckline and two slits to create the armhole. The side seams and the arm areas were sewn, creating a sharp A-line silhouette in a triangular shape starting at the waist and getting fuller as length increases. Leftover scraps from a previous project produced the bias tape neckline and the trimmed finish. After adding these finishes, the few scraps left over were sewn down as appliques in the bottom righthand corner of the garment. The top can be worn in two ways; left untied or with the handkerchief bottom tied at the corners.

Upcycled Patchwork Skirt

Figure 58: Patchwork skirt front  Figure 59: Patchwork skirt back
The researcher created this piece entirely from leftover scraps from other projects. Wanting to design something utilizing a patchwork technique, she decided to make a one-size-fits-most wrap skirt with patchwork appliques. Rather than starting with a set amount of yardage, a pile of scraps was used to produce this skirt. Most of the pieces are cotton/linen blends, so they worked well together.

The researcher began by patchworking the smaller pieces into a more significant fabric piece, including one long strip for the gathered trim. She had a large enough section of fabric to cut the principal portion of the skirt in one piece and used the leftovers for the waistband and patchwork components.

**Implications & What Was Learned**

The most important thing learned through this process was how to adapt the design process for the zero-waste design method. Traditionally, a designer usually comes up with
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a concept, sketches it, creates a flat (a two-dimensional designed garment), designs the pattern using either the flat patternmaking method or by draping. The designer then sources the materials, creates the muslin, and then creates the garment out of the final material.

While doing this project, most of these steps were eliminated. The researcher began with a piece of sustainably sourced fabric and, inspired by the fabric's design, began cutting into it without having a final idea in mind. It was a very intuitive and fluid process, which the researcher enjoyed because it removed the typical limits one has when trying to execute a particular idea.

Another implication from this study of the zero-waste design realized how impractical this method could be. If these patterns were developed for these designs and then sent to be graded and manufactured, there would face additional challenges in ensuring zero waste production. That is why, if the researcher does implement this new design technique into her business, she would likely make each piece one of a kind, letting the fabric speak to her and designing in this unconventional method.

The zero-waste design has its specific implications; the patterns would not be very scalable as the researcher would be creating each piece by hand. However, the sustainability component and exclusivity of the design would add the value needed to increase the price accordingly.

While enjoyable in some ways, the researcher did find the process of learning zero-waste design to be quite frustrating. While trying to avoid any cutaway areas and create a complex enough garment to be attractive, it was a challenge not using existing patterns and designing entirely from scratch.
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Some pieces attempted to make did not work out at all, and those unsuccessful pieces generated another problem; what to do with the material used in unsuccessful pieces? It would be counter-productive to waste this material, so she found her fabric stash grew considerably with pieces that did not work or were left unfinished out of frustration.

This frustration, along with an internal dialogue about perfectionism and zero-waste, prompted a discussion with industry professional Benson Roberts. He led this researcher to realize that perfection and the relationship to sustainability are unachievable. It is more about taking small steps and making an effort toward a specific goal.

The researcher learned resiliency and problem-solving skills as she faced challenges in the creation process. By learning zero-waste design as a technique, she added a skill to her design portfolio and learned an entirely new way to approach sustainability. Using post-consumer waste as the initial material and designing in a way that emits little to no byproduct, she created eco-friendly, unique, and innovative pieces.
References


