

Fall 2022

Sustainable Fashion Design Exploration: Transformation to Zero-Wash

Colleen Moretz

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A woman with long, wavy brown hair is wearing a vibrant red, off-the-shoulder gown with a large floral detail on the shoulder and a full skirt. She is looking off to the side. The background features a modern glass skyscraper with a blue-tinted facade under a cloudy sky.

Colleen Moretz: Sustainable Fashion Design Exploration: Transformation to Zero-Waste

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FACULTY/STAFF EXHIBIT AWARDEE

Sustainability has been at the center of my scholarship across the apparel and textile disciplines. Focusing my creative design scholarship on sustainability generates awareness of sustainable issues within the apparel industry to hopefully encourage change in fashion practices. This concentration on sustainability has been an evolution of investigating sustainable design processes through the exploration of transformation, aesthetics, zero waste, and up-cycling.

The exhibition is complemented by zero-waste and transformable designs by FDM Fashion Design in the Apparel Design Studio 3 course.

Dressed to Persuade: Seeing Red

Color is an ubiquitous form of non-verbal communication. Color affects people psychologically, evoking feelings and memories. Color can also provoke a positive or a negative reaction depending on its context and on an individual's personal perception. Advertisers capitalize on their intended audience's emotions, arousing reactions and swaying their thinking through the use of color, profiting from successful color communication. Within 90 seconds people make up their minds about initial interactions with either people or products. Approximately 62-90 percent of the assessment is based on colors alone (Singh, 2006).

Right: Design featured in *Philadelphia Style Magazine* December 2013.



Dressed to Persuade

This design follows the idea that expression is intertwined with aesthetics.

Selected Design on exhibit at the 2016 ITAA Conference

The red gown, *Dressed to Persuade: Seeing Red*, was commissioned for an ad campaign to be featured in a holiday issue of a magazine, on the side of buses, and on bus shelters. The client obtained inspiration for the campaign from vintage James Bond movies. The model in the dress was to be the focal point of the ad and the dress needed to portray class, sophistication, and glamor. The client's main specification for the dress was that it needed to be red.

Red is a powerful color (Mona Yazdandoust Mofarah, 2013). It can communicate adventure, excitement, convey confidence, and represent beauty, perfect for the Bond connection.

In the magazine, a shapely strawberry blonde model wore the gown, posing as the ultimate "Bond" girl in the ad. A red, silk dupioni with blue undertones was selected to complement the model's coloring. It was stipulated that the skirt of the gown needed to be "big and dramatic" to fill a two-page spread.

Knot What it Seams

Dean's Theme Award: Redefining, Redesigning Fashion: Design for Sustainability, Goldstein Museum of Design Exhibit; Selected Design on exhibit at the 2010 ITAA Conference.

This garment was created for a modern bride participating in typical American style weddings. The gold color of the dress is an alternative to the traditional white. Brides sometimes choose to bring in some color to their look by adding trims and sashes; this dress offers that splash of color within a traditional color range.



The whole of the outfit serves three purposes for the modern bride as she proceeds through the activities of her wedding day.

The bride begins "tying the knot" by wearing a jacket, representing modesty. The asymmetrical hemline, creative bodice, antique grommets, and fashionable tassel create the jacket's modern style. A silk train is also attached to the rear of the damask jacket, providing a classic bridal appearance from behind for the benefit of the audience. The tassel accent on the front of the jacket subtly expresses the concept of "tying the knot." The bead and crystal embellishments suggest styles of luxurious cords and tassels from the southern, antebellum era.



Once removed, the train and jacket reveal hidden grommets, straps, and jeweled-detail on the smocking of the bodice, allowing the bride to arrive at the reception with a more revealing look.



The bride could continue wearing the hip-drape during the dinner and first dances. However, when the event evolves into informal dancing and chatting with guests at each table, the bride can remove the hip drape and transform the dress into an elegant evening gown. Of special interest is the incorporation of the gathered, twisted and beaded flounce at the bottom of the dress, which enhances the dance movements and provides a lovely modern Victorian silhouette. In all these situations, the dress performs perfectly for its variety of intended purposes. The wedding dress is much more than what it may seem at first glance. In other words, it is "Knot What it Seams."

Heirloom Elegance: Something Old is New

Selected Design on exhibit at the 2013 ITAA Conference

As products reach the end stage of the life cycle, decisions must be made regarding how to dispose of them. The most common approach is to donate usable items to charitable organizations. However, products that are seen as limited or no use are often sent to landfills.

Designers dedicated to social responsible actions can develop creative ways to reuse and extend the life of all, or parts of, end-stage products. Household textiles are ideal resources for up-cycling because, while their initial use may no longer be fashionable, their heirloom status makes them difficult to discard. Repurposing heirloom textiles not only extends their life but also sustains precious and cherished memories associated with their previous uses.



The objective of this design was to repurpose heirloom linens. Three distinctly different table linens including (a) woven damask, (b) embroidered cutwork, and (c) hand embroidered linen served as inspiration for the design. These textiles, handed down over many years from family members, were combined to create an elegant contemporary bridal gown consisting of a corset, peplum, and train.

These magnificent, finely crafted heirloom linens are revealed as something new to allow old memories from the past to meld with new memories in the future.



Transformation Inward Out

Selected Design on exhibit at the 2017 ITAA Conference

Overconsumption has been a trend since the turn of the 21st century. This idea of buying quantity and not quality has created negative influences on our environmental, economical, and societal resources. With today's competitive social media scrutiny, celebrities are seen wearing designer fashion only once. Dedication to socially responsible actions is the primary focus for my designs' research, inspiration, and development.

The design *Transformation Inward Out* evolved from an experimental skirt. The result is a kinetic construction theory that works from the body outward in contrast from the traditional method of working from the outside inward toward the body (Lindqvist, 2015).

The purpose of the final design is to incorporate innovative design, draping, and pattern making with a focus on increasing the value of the garment by encouraging extended usage.



Transformation Inward Out can be adjusted in both length and silhouette, allowing it to be worn in different ways and in various contexts. A future garment will be created using the same pattern, but the skirt will be constructed from a sheer fabric. This will lighten the weight, and the skirt will be transformed with ease. The construction will be a challenge because the skirt and the inner seams will be somewhat visible.

This, like Lindqvist's sphere project, will show the viewer the inner workings of the skirt to better understand the pattern cutting method that works from the body outward. In keeping with Lindqvist's theory, this garment will show the unrestricted movement of the wearer's legs.

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The Business of Fashion and McKinsey & Company

Transparent Pannier

Selected Design on exhibit at the Indianapolis Museum of Art: Cutting Loose 2015 Exhibition; Selected Design on exhibit at the 2017 ITAA Conference; Selected Design on exhibit at the 2016 Costume Society of America Conference.



This design juxtaposes eighteenth century and contemporary ideal body images. Eighteenth-century fashion transformed the female body into the silhouette (Fillmer, 2010). The female body was manipulated with the use of elaborate devices, layers of understructures, and foundations to hide and alter the woman's true physique. In contrast, the body itself has become a powerful medium of expression in twenty-first century fashion, transforming through diet, exercise, cosmetic treatment, and plastic surgery (Fukai, 2012).

The *Transparent Pannier* represents the fusion of Jean-Paul Gaultier and Vivienne Westwood's deconstruction designs and the historical evolution of body image. Gaultier and Westwood both featured designs that are a form of deconstruction by rearranging pre-existing structures. For example, they incorporated corsets as outerwear by reversing the inner and outer clothes, blurring the lines between outerwear and underwear (Fukai, 2012).

The *Transparent Pannier* design reveals the architecture and engineering of the pannier to the viewer. The figure of the wearer is exposed and enhanced by the lines of the design and the aesthetic sense of the pannier. The design exposes and compliments—not hiding nor transforming—the female body. This piece melds the past with the present.



Transparent Pannier uses the elements of design to enhance the body structure, physical coloring and body movement (Lamb and Kallal 1992). The design is novel in the use of contemporary materials to interpret and execute historical elements of construction.

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Macchia Spiral into Zero-Waste Times Two

Designed by Colleen Moretz and Sandra Keiser, Mount Mary University

Selected Design on exhibit at the 2020 ITAA Conference; ITAA 2020 Award for Creative and Innovative Employment of Techniques



Macchia Spiral into Zero-Waste Times Two uses zero-waste pattern design, an approach that makes the patternmaking stage an integral part of the design process, rather than a stage that follows it. In addition, dyeing the fabric to size eliminates wasted dye.

Macchia Spiral into Zero-Waste Times Two evolved from Sanah Sharma's Planar Flux Hybrid Clothing Technique. One of Sharma's alternative pattern cutting techniques utilizes a double spiral pattern resembling a yin-yang. The double spiral is cut apart, leaving the square edges attached to the bottom areas of each spiral. (See Diagram A & B).



Honeycomb dyeing was used on two squares of silk. Five colors of dye were then painted on to the fabric coil in order to replicate the multi-colored spotted effect of Dale Chihuly's Macchia glass. The process of dyeing was repeated three times, wrapping the fabric in a different direction each time. Two of the double spiral patterns were cut to reflect the sizes of the two dyed fabric pieces. (See Diagram B). The fabric was draped and wound around the body-form, with zipper and darts added for fit.

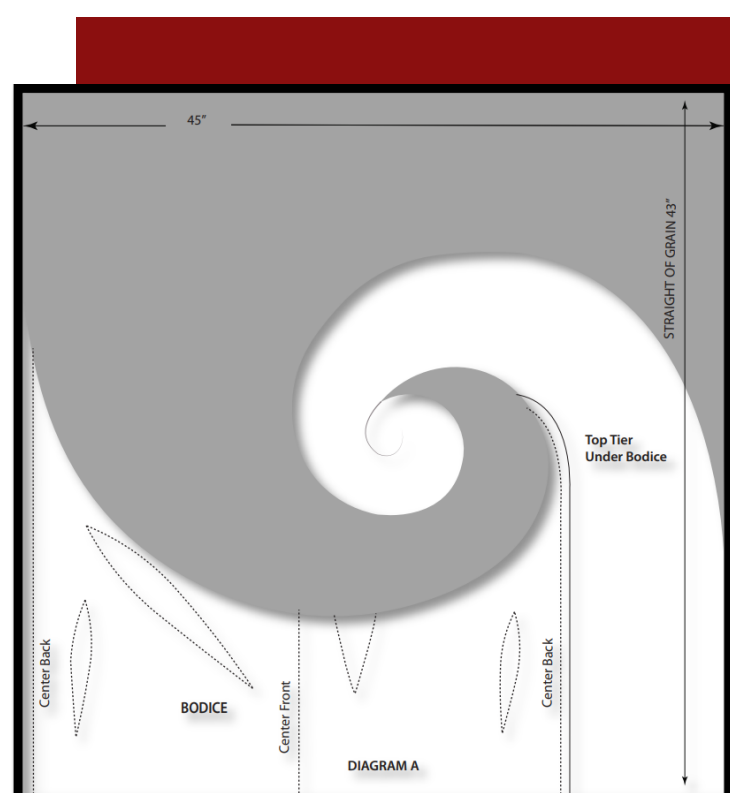


Diagram A

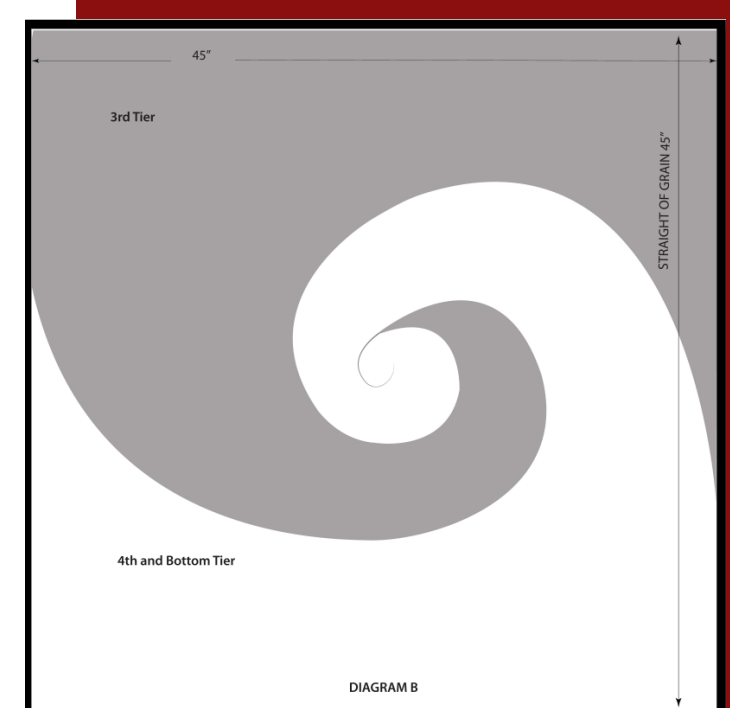


Diagram B

Macchia Spiral Into Zero-Waste Times Two effectively addresses the environmental concerns of pre-consumer textile waste while creating an innovative design that speaks to the form and function of the body. Acid and fiber reactive dyes were used to get to the depth of color that is achieved in Chihuly's glass. These dyes resist fading and can be safely disposed of giving the garment a longer life than what might be achieved with natural dyes. The outcome of the *Macchia Spiral Into Zero-Waste Times Two* garment was unexpected, inventive, and freeing.

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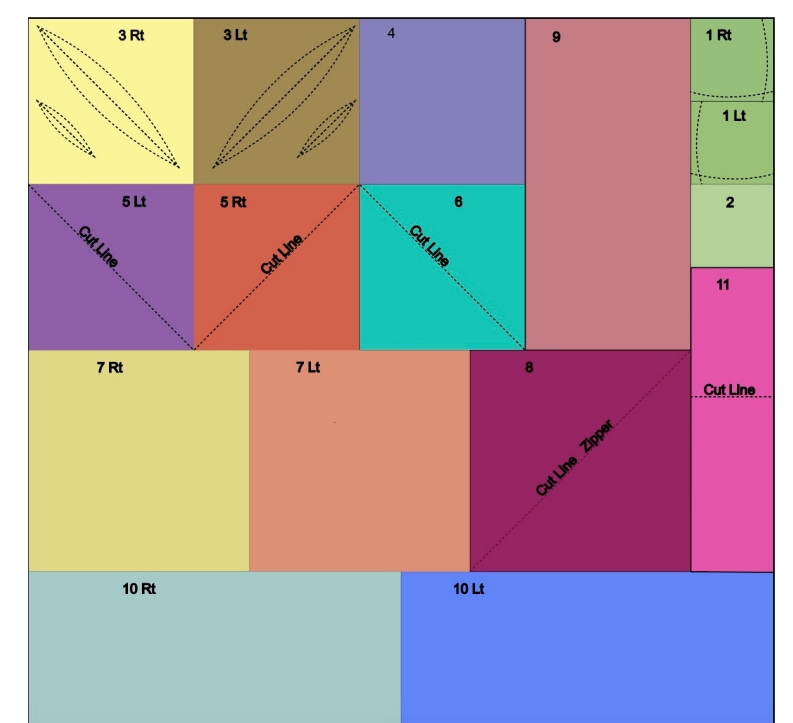
Magenta Zero-Waste Design

Investigation

The chosen product category was lingerie/loungewear. I planned to develop three adjacent sizes in an industry-specified size range. Three sizes of dress forms (sizes 4, 6, & 8) were utilized to test the draping of the squares working originally from the base size 6 down to the size 4 and up to the size 8. Grading was achieved by varying the widths of strategically inserted lace.



The initial concept was to use squares and rectangles on the bias to create a design with desired drape on the body-form. The taffeta fabric is 54" goods, meaning that the squares and rectangles needed to fit together within a 54" width parameter. Hours of mathematical reasoning refined the layout. The pieces were cut using a rotary cutter and then draped onto the size 6 body-form. Since the pattern does not change from size to size, all sizes could be cut at once. Adjustments were made in the seam allowances and pattern sizes to keep within the 54" fabric width. Double-ended darts were added at the side seams of #3 and on the back side of #3 to accentuate the curve of the body. The #8 piece was cut down the middle along the bias to insert the zipper at the center back using a 1/4" seam allowance. A strip of tricot interfacing was added to stabilize the bias seam when attaching the zipper. Once the muslin test pieces were accurate, the pattern was cut into the magenta taffeta. With the intention to put the design into mass production, the decision was made to staystitch and overlock each piece. The overlock finished the edges and the staystitch served as a guide for the seam allowance needed for each piece. The edges of #1, #2, and #3 pattern pieces were pressed under the seam allowance to fill the 1/2" gap with a lace. The gap can also be filled with a strip of self-fabric or a contrast fabric (cut along the crosswise grain of the fabric) to change the design aesthetics. The next step was to take the same pieces and apply them to the size 4 and size 8 body-form. The size 4 requires a 1/4" lace or fabric strip insert and a 3/4" lace or fabric strip at the side seam. The size 8 needs a 1 1/4" lace or fabric strip insert and a 3/4" lace or strip at the side seam. An adjustment was needed on both the size 4 and size 8 to piece # 4 at the top at the center front seam allowance.



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Magenta Zero-Waste Design

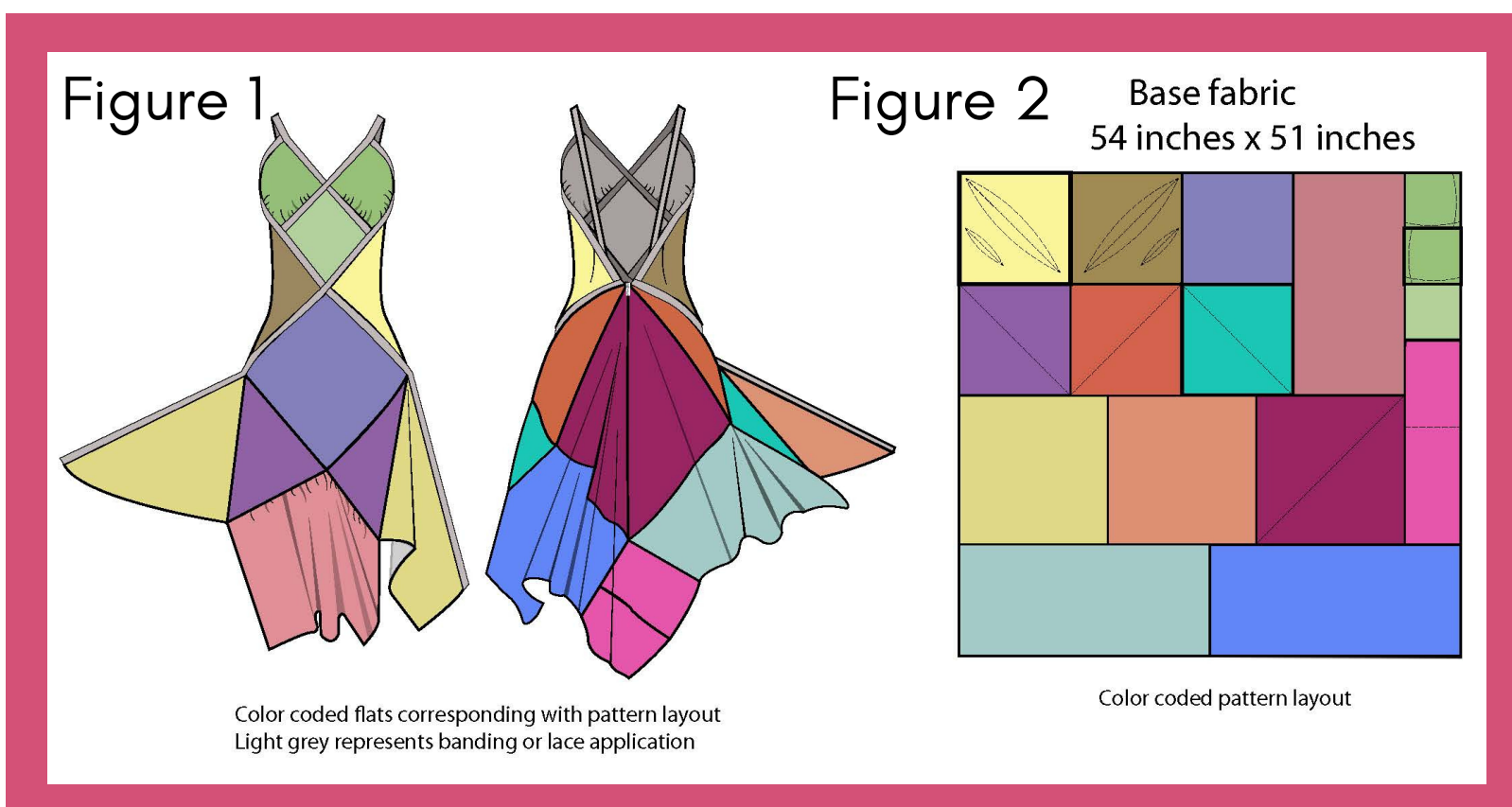
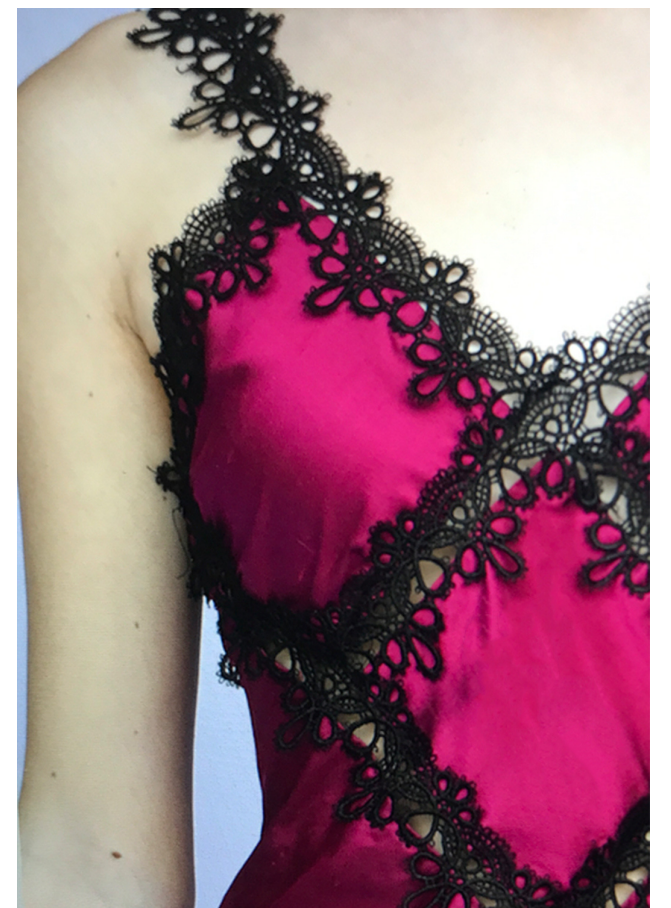
Investigation



Traditional garment production yields approximately 15% of fabric waste. Zero-waste fashion design addresses this concern by producing garments without fabric waste during the cutting stage of garment manufacturing. *Magenta Zero-Waste Design Investigation* was created from a zero-waste pattern design. Usually, a zero-waste design is restricted by the width of the textile, inhibiting the ability to grade a zero-waste design while keeping the overall integrity of the design intact. Grading increases or decreases the size of a pattern, while maintaining an appropriate relationship to shape, fit, and balance of the design.

This zero-waste garment that incorporated the Zero-waste Banded Grading (CZWBG) technique, a

method developed by designer Melanie Carrico. CZWBG utilizes the insertion of strategically placed narrow fabrics and/or trims to grade garments without making changes to original pattern shapes.



In this modified modular approach the pattern pieces consisted of either squares or rectangles that fit together on the pattern layout with no gaps (Figure 1). The pattern pieces are color coded to show their alignment with the corresponding garment parts (Figure 2). The integrity of the

designer's aesthetic was kept by placing the square pieces diagonally to create interesting lines on the torso of the body-form, emphasizing the fit and shape of the female figure. Rectangle shapes were added below the torso to add flare, bringing attention from the torso down to the hem. A remnant piece of magenta, polyester taffeta, was utilized to further create a bold yet feminine statement. The black lace accentuates the impactful, diagonal lines.

The focus is on increasing aesthetic sustainability traditionally lacking in zero-waste designs by speaking to the form and function of the female body adding marketability to the design.

Overall the design investigation was successful in utilizing the CZWBG for grading zero-waste garments and conceivably assimilating the garment into mass production. The integrity of the design is visually intact among all three sizes. The biggest challenge will be in relaying construction details to the stitches. For example, there are specific adjustments that are needed to the seam allowance from size to size. Additionally, cost will be incurred to insert the bands or lace.

Kaleidoscope: Spiraling Patterns and Color

Selected Design on exhibit at the 2022 ITAA Conference

Kaleidoscope: Spiraling Patterns and Color is a collaborative design that features silk organza on which successive shibori techniques were layered to create a complex reflective pattern that changes as it spirals around the body, allowing light to reflect off the fabric as the grain shifts. The fabric was cut using an original spiral pattern cutting technique, eliminating the pre-consumer textile waste usually created during the cutting process. It is part of a design series created by utilizing the double spiral pattern that reduces the amount of fabric needed. This unique linked double spiral pattern, resembling a yin-yang, is cut apart, leaving the square edges attached to the bottom areas of each spiral resulting in a zero waste pattern that can be adapted to any fabric width.



A color palette of blues, blue-violet, teal, and turquoise, with an accent of chartreuse green was chosen to dye the silk organza. The reflective translucence of the fabric pattern influenced the silhouette and drape of the garment. A piece of iridescent blue/green silk taffeta was used for the underskirt to compliment the organza. Though not cut from the spiral pattern, the underskirt is cut from a zero-waste pattern that juxtaposes a slim body silhouette under a voluminous organza overlay.

Silk organza was chosen because it lends itself to layering multiple shibori techniques. Sample yardage was used to explore selective degumming patterns, color palettes, and layered shibori techniques. Degumming uses soda ash to remove the seracin gum that remains on silk fibers on fabrics such as organza, gazzar, and gunma silk. The seracin contributes to the crisp drape of these fabrics. Selective degumming, using shibori manipulations, allows one to remove the seracin in only areas outside of an applied resist dye. Six samples were produced, using three different shibori techniques for selective degumming. This resulted in a white on white pattern of soft, somewhat opaque spaces juxtaposed with crisp, translucent areas where the seracin remained. Further experimentation explored color combinations and the overlay of a more colorful shibori pattern.



The final yardage was selectively degummed using an arashi shibori technique that resulted in a zigzag pattern all over the fabric. The fabric was vat dyed in a hyacinth MX dye. About 50 kumos were put into each of the three fabric squares using rubber bands.

Kaleidoscope: Spiraling Patterns and Color



Each piece of fabric was wrapped diagonally around a PVC pipe, bound with a twisted synthetic sinew, and then compressed into tiny folds. The wrapped PVC pipe was placed in a thiox discharge bath to remove some of the color and then dye was painted onto the discharged areas. The fabric was heat set using a space heater while still on the PVC pipe and again in the microwave once it was removed. This design incorporated three of the double spiral patterns measuring 54" X 54." The patterns were sized in Photoshop and then printed out in the desired fabric width. To conserve muslin, a preliminary drape was developed on a half-scale form using three of the double spiral patterns that reflected the sizes of the organza. Since the design originated from a pattern, the next step was to drape the cut organza

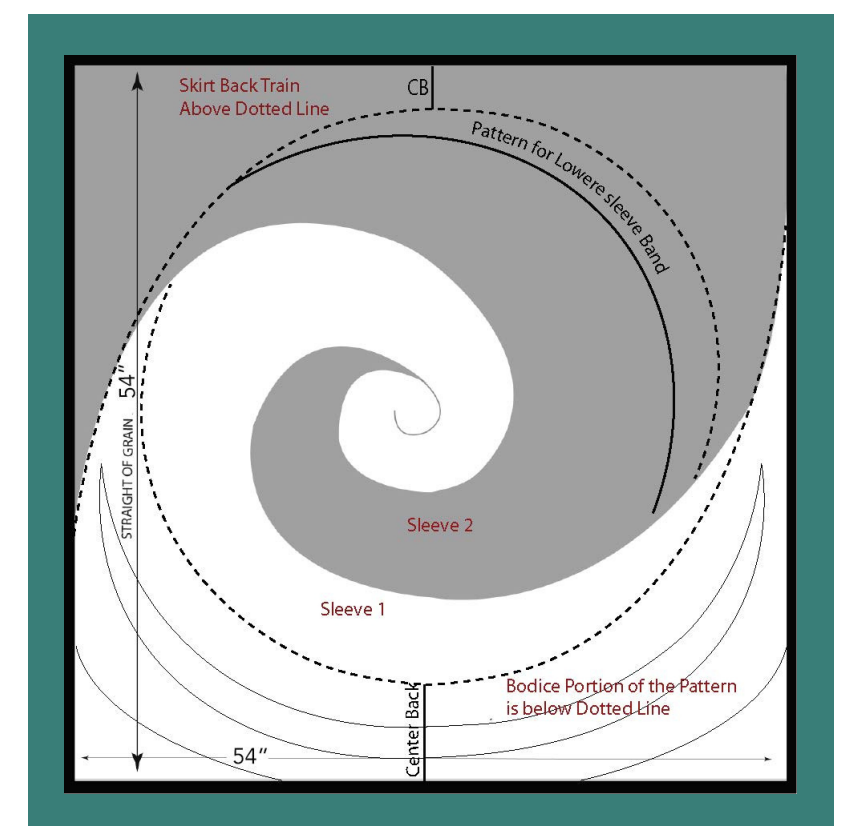
spiral pieces onto the full-scale body form, replicating the half-scale version. Many adjustments and edits were finalized when draping the dyed organza onto the full-scale form. The dyed organza dictated the spiral placement to best highlight the variations. The third spiral pattern (Diagram 1) indicates where the bodice, sleeves, and bottom train was derived. The organza spirals were sewn together with raw edges to the outside of the garment. The cut edges are predominantly on the bias and will not fray. This technique accentuates the spiral, without taking away the beauty of the organza.

Dialog was critical at each step of this design collaboration. Samples and photos were exchanged regularly to determine the most dynamic fabric pattern, to finalize the color palette, to select a coordinating fabric, and to make silhouette decisions.

The design addresses the concerns of pre-consumer textile waste while creating a compelling, innovative design that pays attention to

the beauty, form, and function of the female body. The garment is created to add value to the wearer as an example of aesthetic sustainability.

This spiral zero-waste pattern cutting technique frees the designer from starting with a preconceived design and then developing patterns. The outcome was somewhat unexpected, innovative, and freeing.

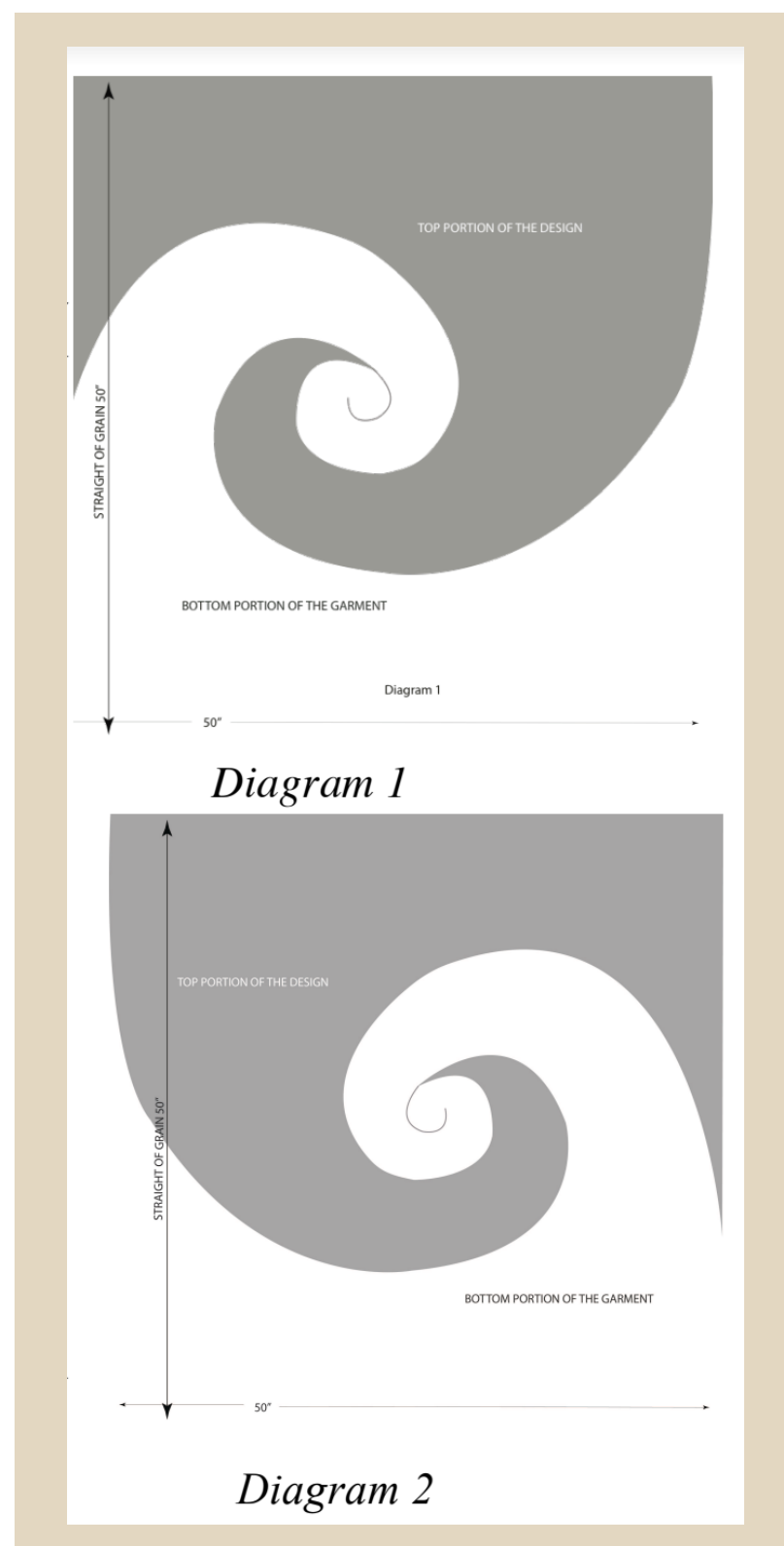


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Spiraling Into Design Inspiration

The fashion industry is in the current state of overproduction and over consumption of fashion that has resulted in a proportionate increased use of resources, particularly textiles. Zero waste fashion design treats textiles with integrity by producing garments with little or no fabric waste.

Spiraling Into Design Inspiration was the outcome of a continued investigation of the zero waste patterns in Diagrams 1 & 2. This pattern indirectly resulted from the investigation of Sanah Sharma's *Planar Flux Hybrid Clothing Technique*. Patterns that are developed from a spiral reduce the amount of fabric needed to develop a garment. This pattern was used in several previous designs and the only vision for this design was to use the same basic pattern to create a jacket with voluminous sleeves accompanied with a skirt. There was no other preconceived concept for the design outcome prior to the draping of the separated spirals onto the half-scale form.



To emphasize the spiral that unglutes around the sleeves, the fringed edge of the selvage was sewn into the seams of each sleeve. The fringe selvage was also used around the collar. The right side of the jacket was created by utilizing the pattern in Diagram 1 and the left side was created using the pattern from Diagram 2, creating mirror images of each other.

Spiraling Into Design Inspiration successfully meets the needs of the environment, the industry, and the individual by creating a flexible, creative design that speaks to the form and function of the body in a responsible way.



Spiraling Into Design Inspiration

Due to COVID-19, I was not able to order fabrics nor receive quick deliveries. Instead, fabrics were purchased at a local interior fabric outlet store. An upholstery weight fabric (54" goods) was selected first with the preconceived idea to design a jacket with large spiral sleeves. A drapery weight silk (48" goods) was selected for the skirt. The spiral pattern (Diagram 1 & 2) stayed consistent by adjusting the original pattern to the width of the fabric. A half scale version of the pattern was used to drape on a half scale form. A decision was made to cut the full-scale pattern out in the final fabric, due the weight of the fabric, and draped directly onto the full-scale dress form. Since the final outcome of the garment was not predetermined, preliminary design decisions were made as the fabric was being draped and wound around the half-scale form. Changes were finalized to adjust for the drape of the fabric on the form. The traditional rule of the grainline running parallel to the center front and center back is not followed in this design. The garment was constructed using couture sewing methods. The skirt was made of numerous French seams.



The outcome of the *Spiraling Into Design Inspiration* garment was unexpected, creative, and liberating. The designer had to deviate from her traditional design methods to develop this zero-waste garment by bringing the pattern into the design process. Further experimentation using the spiral to inspire and create zero-waste garments will continue. The outcome of zero waste design practices and research is usually accidental and intuitive.

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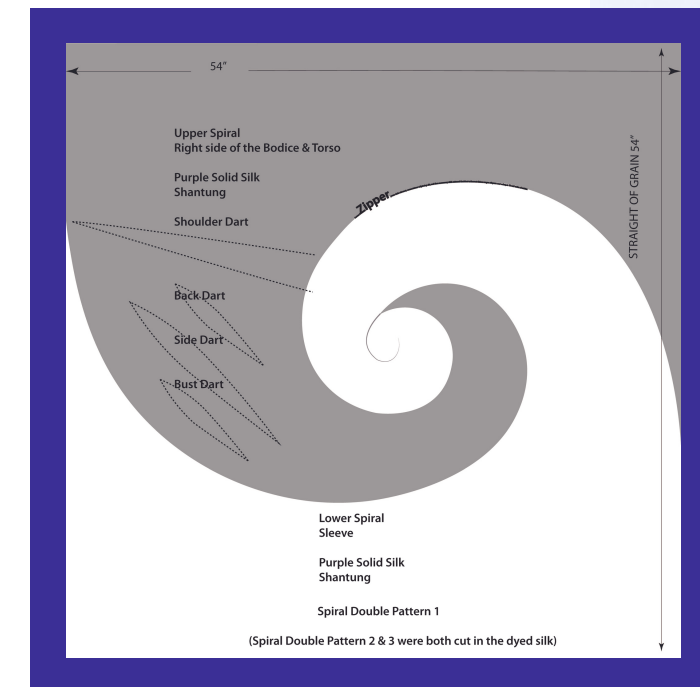
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Spiral Counterpoint Times Three

Selected Design on exhibit at the 2021 ITAA Conference; TAA 2021 Optitex Technology Award.

Spiral Counterpoint Times Three was inspired by past collaborations and a desire to employ a more sustainable design process. A unique spiral pattern cutting technique, which eliminates scraps, is complemented by a double shibori dyeing method. The design began with a fabric purchased as a remnant and expanded by dyeing the fabric to size, eliminating any waste in dye use. The vision for this design was to create an asymmetrical, one-shouldered evening dress that featured a voluminous sleeve and balanced by a spiral motif on the opposite hip. It is part of a design series created by utilizing the double spiral pattern (Figure to the Right).



Experimenting with the spiral pattern, an innovative

double spiral pattern was created that resembles a yin-yang (a linked double spiral) that is cut apart, leaving the square edges attached to the bottom areas of each spiral and resulting in zero waste.

An analogous combination of blue, blue-violet, and purple was chosen for this design, with an accent of chartreuse green to dye the silk fabric that was used in two of the three double spiral patterns. A third double spiral was cut in a purple silk shantung remnant that created a harmonious juxtaposition with the dyed pieces. The counterpoint between the purple fabric and dyed fabric accentuated the spiral on the left hip, visually balancing the voluminous sleeve on the right. A purple cording was added to highlight the spiral of the sleeve and the upper edge of the bodice. The body of the gown incorporated numerous darts and pleats to accentuate the feminine figure, developing an overall compelling and harmonious garment.



The remnant silk, yarn dye was scoured, and a half-yard was cut off for testing. Two shibori dyeing techniques and multiple variations were tested. After several experiments, it was determined that beautiful color effects could be achieved without using the harsh process of discharging. Wrapping the fabric with the lengthwise grain of the fabric proved more interesting and gave more uniform results than wrapping it on the bias. Rather than following the straight line of the weave, the bias cut places the pattern at a 45° angle on the woven fabric. At this angle, the “warp” and “weft” threads give the fabric more of an elastic stretch.

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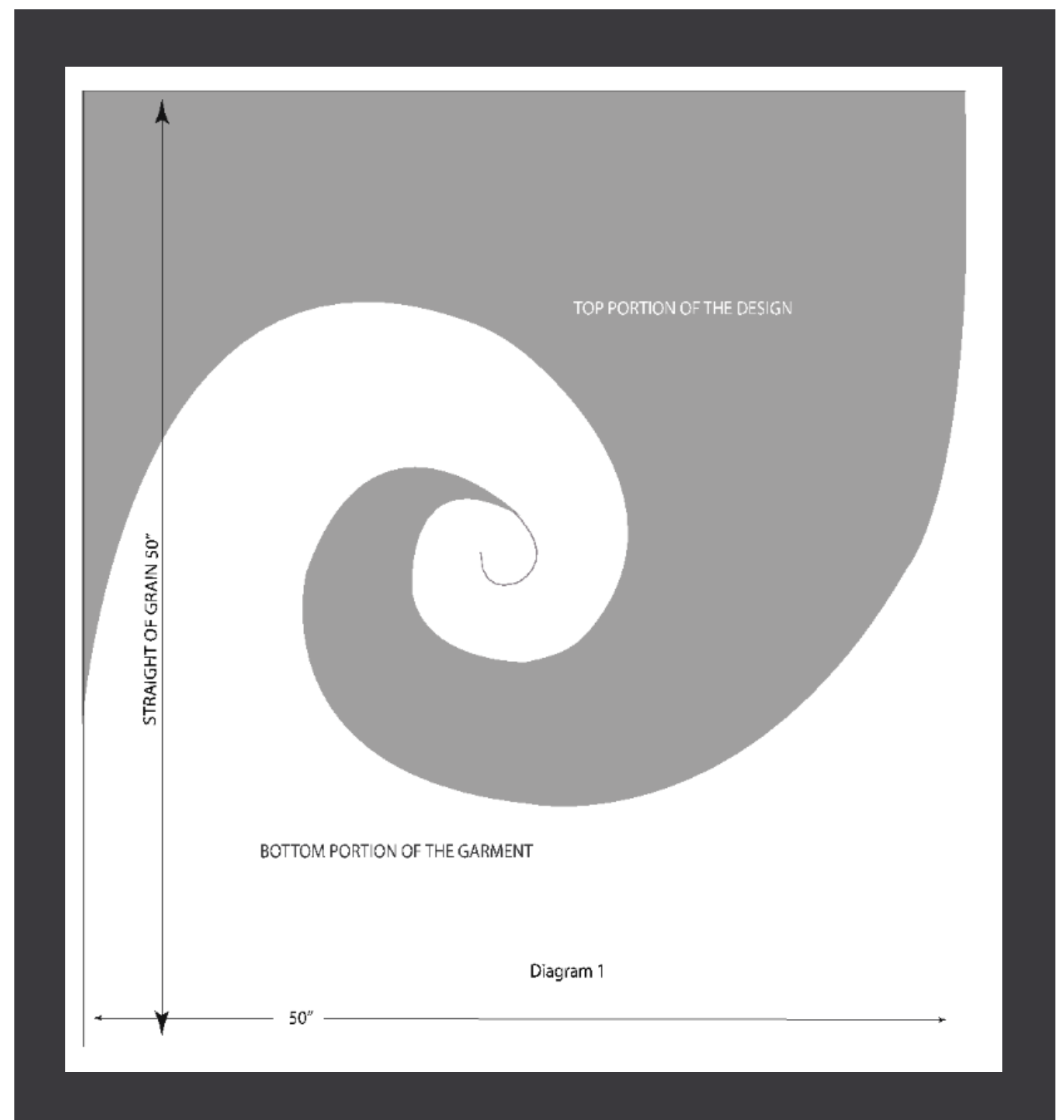
Rissanen, T. (2020). *Zero Waste Fashion Design*. London: Bloomsbury Visual Arts.

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Spiral Into Zero-Waste

Selected Design on exhibit at the 2018 ITAA Conference

Traditional garment production using the “cut and sew” method of cutting fabric pieces and sewing them into a garment yields approximately a 15% fabric waste. Zero-waste fashion design addresses this concern by producing garments without fabric waste. This design, *Spiral Into Zero-Waste*, is a double spiral pattern that resembles a yin-yang cut apart (See Diagram on Right). The only vision for this design was to use the same basic pattern to create a full garment with zero-waste.



The fringed edge of the selvage was sewn to the outer edge of the garment. The bodice’s front and back, as well as the collar, were created as the top spiral pattern wraps around the upper part of the body, then extends down the wearer’s right side.

To create visual balance, the remaining selvage fringed edge was hand-sewn, starting with a small spiral on the left side fed through grommets that help cinch in the waist and ending in a larger spiral that sits below the right hip. Double-ended darts and pleats were strategically placed along the waistline to emphasize a feminine figure. *Spiral Into Zero-Waste* successfully meets the needs of the environment, the industry, and the individual by creating a flexible, creative design that speaks to the form and function of the body in a responsible way.



Spiral Wrap



A half-scale pattern was utilized from a previous design. The final outcome of the garment was not predetermined. Preliminary design decisions were made as the fabric was being draped around the half-scale form. Adjustments were made to a full-scale pattern that was drafted, cut into muslin, and draped onto a full-scale form. Changes were finalized in the denim to adjust for the drape of the fabric on the form to accentuate the waist with darts and pleats. The traditional rule of the grainline running parallel to the center front and center back is not followed in this design. The bias is evident at the center back and at the center front, creating an appealing drape. A coral topstitch was used to outline and accentuate the spirals. Hooks and snaps were strategically placed to maintain closure.

The outcome of the *Spiral Into Zero-Waste* garment was unexpected, creative, and liberating. The designer had to deviate from her traditional design methods to develop this zero-waste garment by bringing the pattern into the design process. Further experimentation using the spiral to inspire and create zero-waste garments will continue. Contributing to Dame Ellen MacArthur's idea that, instead of just trying to "do less bad," we need to change the way we make and use clothes. By doing this, we ensure that their production and use builds economic, societal and natural capital rather than depleting it (The Business of Fashion and McKinsey & Company, 2017).

The Business of Fashion and McKinsey & Company . (2017). The State of Fashion 2018. London: Niinimäki, K. (2013). Sustainable Fashion: New Approaches. Helsinki, Finland: Aalto University publication series.
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Shama, S. (2015). Planar Flux, A Hybrid Clothing Technique. Retrieved August 20, 2017, from <http://planarflux.wixsite.com/design>



Spiral Counterpoint

Times Three

Several colorways were explored. An analogous combination of blue, blue-violet, and purple was chosen with an accent of chartreuse green. Each square of fabric was gathered and wrapped around a 2-inch Vulcan climbing rope and bound. The bound fabric was dyed using a combination of acid dyes and MX dyes that were applied at full strength with a foam brush. The ropes were wrapped with cellophane and allowed to cure for 48 hours—some of that time heated with a space heater. The fabric was unwrapped from the rope and rinsed, then washed in synthrapol and further set with an iron.



To conserve muslin, a preliminary drape was developed on a half-scale form using three of the double spiral patterns that reflected the sizes of the purple and the two dyed fabric pieces. Piece #1 (purple) was 54" wide by 54" long (see Figure 1), piece #2 (dyed) was 54" wide by 50" long piece #3 (dyed) was 54" wide by 52" long. Each piece of muslin was marked and labeled to be replicated onto the full-scale form. Preliminary design decisions were made as the muslin was being draped, wound around the half-scale body form, and pinned in place. Since the design originated from a pattern, the next step was to drape the cut spiral pieces onto the full-scale body form replicating the half-scale version. As the drape progressed in its design, adjustments and edits were finalized on the full-scale form, allowing the fabric to be sewn and pressed. This draping process assures that the spiral placements, as well as the weight, body, and dyeing variations of the fabric, are aesthetically pleasing.



The design effectively addresses the ethical and environmental concerns of pre-consumer textile waste while creating a compelling and innovative design that takes into consideration the form and function of the female body. Acid and fiber reactive dyes were used to get to the depth of color achieved. These dyes are faster to light and wash, giving the garment a longer life than what might be achieved with natural dyes.

The Business of Fashion and McKinsey & Company . (2017). The State of Fashion 2018. London: The Business of Fashion and McKinsey & Company

Harper, Kristine H. (2017). Aesthetic Sustainability [Digital Version]. New York: Routledge.

Niinimäki, K. (2013). Sustainable Fashion: New Approaches. Helsinki, Finland: Aalto University publication series.

Rissanen, T. (2005). From 15% to 0: Investigating the creation of fashion without the creation of fabric waste. <http://www.scribd.com/doc/51833062/Timo-Rissanen>.

Rissanen, T. (2013). Zero waste fashion design: a study at the intersection of cloth, fashion design and pattern cutting (Doctoral dissertation).

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Sharma, S. (2015). Planar Flux, A Hybrid Clothing Technique. Retrieved August 20, 2017, from <http://planarflux.wixsite.com/design>

The background of the page features several fashion design sketches. In the top left, there are line drawings of a garment with intricate floral patterns, accompanied by handwritten notes: "Bina Marachini Spring/Summer 2018" and "Leah things to do". In the top right, a hand-drawn sketch of a long-sleeved, form-fitting dress in shades of green and yellow is shown, with the text "look(6)" and "Bina Marachini" written next to it. Below this sketch, there are more notes: "inspired by Russian cost" and "16/12/2017 Bina Marachini". At the bottom right, a hand with several rings is visible, resting on a wooden surface. The overall aesthetic is that of a fashion designer's workspace.

Sustainable Student Design Exploration: Transformation to Zero-Waste

The following designs in this exhibit were created by Colleen Moretz' spring 2022 Apparel Design Studio 3 course. Moretz selected these designs to complement her exhibit for their zero-waste and transformable qualities.

Sources for: Gimmie Shelter:

"Artwork Detail." Artwork Detail | Kemper Art Museum, www.kemperartmuseum.wustl.edu/collection/explore/artwork/1197.
Sharpe, Laura. "Rauschenberg - Transfer Techniques." LF House of Art, 19 Sept. 2015, lauramarie363.wordpress.com/2015/09/18/rauschenberg-transfer-techniques/#:~:text=Rauschenberg%20developed%20a%20process%20known,images%20with%20a%20dry%20nib.]

In Bloom:

Ross, C. B. (2017, April 26). *What is Zero waste fashion design all about?* The Sustainable Fashion Collective. Retrieved May 20, 2022, from <https://www.the-sustainable-fashion-collective.com/2017/04/26/zero-waste-fashion-design>
Artincontext. (2022, April 5). 'almond blossom' van gogh - analyzing van gogh's Blossom Tree Painting. artincontext.org. Retrieved May 20, 2022, from <https://artincontext.org/almond-blossom-van-gogh/>

French Flare:

Morris, R. (2022, February 17). The history of toile de Jouy. Retrieved May 27, 2022 from Homes & Antiques: <https://www.homesandantiques.com/antiques/collecting-guides-antiques/the-history-of-toile-de-jouy/>

Diamond

Designed by Natasha Yarowenko

This design, *Diamond*, was created to showcase sustainability, hand crafted elements, and technology. Inspiration was drawn from Artist Soo Sunny Park's *Unwoven Light* installation, where iridescent planes of plexiglass were inserted inside fence cells. These cells were welded together to achieve a series of lacy, sculptural forms, which were delicately suspended in space.



“Bold”, “fierce”, and “dressed to kill” are terms that best describe the *Diamond* design. *Diamond* encompasses each of these through colorful, iridescent, acrylic laser cut diamonds, engineered for print design on Adobe Illustrator. The iridescent diamonds allow light to pass through and reflect. The experience looking at the dress is unique to each person, depending on where they are standing and how much light is visible on the diamonds. The silhouette is form fitting through the fabric, allowing the diamonds to drape smoothly over the body while simultaneously manipulating light.

The design and development of *Diamond* includes multiple steps: design ideation, material selection, draping, pattern development, prototype development, laser cutting, model fitting, and assembly of the final design.



During the design process, I created a mood board (Figure to the Left). I chose the color palette and fabrics based on the trend forecasting analysis, considering the target customer.

When creating the fabric side of the design, I began draping it to the dress-form. After finalizing the fabric, I sewed 3 adjustable clear straps, one under the bust and two at the waist into the fabric from the front. I attached a hook in the back to a clear loop. Once I stabilized the fabric to the body, I developed the iridescent acrylic diamonds. I collaborated with students at the engineering lab to create the diamonds in solid works. After cutting several test pieces to find the perfect diamond and hole sizes (used to link each diamond together), all the diamonds were cut from a 24" x 48" and a 24"x24" iridescent acrylic sheet.

Diamond

Designed by Natasha Yarowenko

Challenges were met when putting the diamonds together because the links snapped in half when putting them over the 1/8" thick acrylic diamond. To solve this problem and create a more cohesive look, I exchanged the metal for opal links. To do so, I had to trim the opening of each link using a vertical bandsaw. I then used the JB super weld to seal and close each link. This created a clear seal between each link, keeping the links from separating from the diamonds. Finally, I pieced together each diamond like a puzzle, moving different pieces until the diamonds draped effortlessly on the dress-form.



The cohesiveness of this look is conveyed through the use of iridescent acrylic plexiglass and an engineered print designed to compliment the colors in the acrylic diamonds. Inspired by Parks' *Unwoven Light*, *Diamond* emphasizes sustainability with the use of fabric sourced and printed from an eco-friendly textile company. I emphasized technology through use of the laser cutter to cut acrylic sheets into diamonds and a vertical bandsaw to trim the links. This design is unique because it uses new technology advancements to create the dress while incorporating handcrafted elements, sustainability, and a red carpet feel.

Gimmie Shelter

Designed by Emily Quarantillo

After finalizing my sketch, I started draping with rectangular pieces. I gathered the skirt tiers, draped the bodice and played with cutting asymmetric pieces out of the rectangles to drape the collar. I discovered that pleats stood out better than gathers. I was able to create a pattern that fit all of my pieces with enough green fabric left over to finish the armholes and create my necktie. After fixing and sewing the bodice together, I gathered and attached the skirt tiers together, before sewing it on the bodice. Before attaching the collar, I pleated the pieces and sewed the necktie. I used sprayed starch on the dress to maintain the fullness of the ruffles and to make the collar stand up on its own. Lastly, I finished the edges with flame from a lighter to keep the organza from fraying and create the raw-irregular edge I wanted.



In order to create a balanced garment, I separated the green and printed fabric so one would not over-power the other. I chose a light, shade of sage green to balance the boldness and dark tones in the print. By alternating the four tiers between printed and green fabric, I was able to balance the contrasting pieces while maintaining cohesion throughout the dress. To create both contrast and unity between the collar and skirt, I chose to make the collar green and use pleats to create the same ripple in the skirt with more structure. The closure consists of black, exposed hook and eyes as an element of hardware that ties into the black undergarments exposed underneath.

The asymmetry in the collar reflects my architectural inspirations and was an element that I had not seen in a dress of this nature. The incorporation of family photographs used in the original print further solidifies its originality. I did not want my design to look like a collection of photographs placed on fabric, so I used varying combinations of filters and overlays to resemble an art piece. In contrast to other garments tied with messages about war, this dress does not contain dark, morbid design elements. Instead, this dress communicates my father's experiences and the reflections of his past. This creation casts a light on the privilege and security of having "shelter," that was stripped away from millions of others.



Gimmie Shelter

Designed by Emily Quarantillo

I envisioned a dress incorporating my grandmother's photographs in a Rauschenberg-style print that combined inspirations from my family's history, architecture, and pop art style photos.

Gimmie Shelter represents a joining of these inspirations and the human necessity of shelter. The silhouette of the dress, in contrast, represents the happy, carefree childhood of my father and his brother who were spared the experience of war.



Aesthetically, this dress is soft, light, and buoyant with vivid colors and structured elements that contrast each other. The structured, pleated collar, exposed hardware of the hook and eyes, and translucent element of the organza exposes black undergarments that contrast with the soft and buoyant qualities of the ruffled skirt. The green tie further emphasizes the separation of the asymmetrical shape of the collar, with the symmetrical qualities of the skirt and bodice. The light, sage green color of the sleeveless bodice starts a pattern of alternating, gathered tiers between the print and green color. Four stacked tiers of gathers form a round, ruffled babydoll silhouette that bounces and floats as it walks. The sheer, lightweight qualities of the 100% polyester organza make the print more ominous and abstract from afar.



I researched Robert Rauschenberg's art and technique in which he developed a process known as the transfer process, using photos from mass media. Images from newspapers and magazines were soaked and then pressed face down onto a paper surface, where he then rubbed back and forth across the back of the images. This gave the images a ghostly, forgotten memory look. Rauschenberg often enhanced the results with white gouache, ink washes, or watercolor. I experimented with Microsoft Photoshop using filters, color overlays, and texture overlays to achieve a similar aesthetic. Working with the photos, I became inspired by the tiered, asymmetrical architecture in Japanese towers and buildings. Wanting to combine soft, light elements with the structural elements of the buildings, I sketched dresses with soft, gathered tiers and structured collars.

Spring Affair

Designed by Jacob Dial



The constant need for change and newness is exacerbated in today's society by endless fast fashion options and fleeting trends. With conspicuous consumption growing, it is important to consider ways to buy mindfully. How does one achieve a multitude of looks without overbuying? One way is utilizing transformation. Just like the idea of dressing up a garment, you can do the same with transformation looks, making them appropriate for different occasions. Similarly enough, the way buds blossom into flowers, the skirt falls away to reveal a flower-donned romper, hence the name *Spring Affair*.

Easy on the eyes, this design set stands out to the viewer without being too loud. Pastels will never go out of style, and use of this duckling yellow is intentional to make it timeless. The face of the fabric has a matte finish, proving not all eveningwear has to be lustrous. The skirt is graceful in motion with the hem of the skirt moving similar to flowers dancing in the wind. The weight of the fabric allows for the wearer to breeze by without too much movement of the skirt. The entire look harnesses the art of subtleness, allowing the garments to slowly reveal what they have to offer.

After weeks of ideation, sketching, and research, I began to drape and fit muslins for my look. Construction of the romper was extensive and tested my abilities of handcraft and patience. This princess seam romper consisted of a draped bodice and manipulated short-shorts pattern to create a cohesive piece. This princess seam romper consisted of a draped bodice and manipulated short-shorts pattern to create a cohesive piece. There are three layers, including an intricately woven cotton shell, cotton lawn underlining, and an Italian cotton shirting used for the lining. For more visual interest on the shell, I wove in pink and white cotton yarns. These yarns add a subtle nod to the flowers that were hand sewn onto the bottom half of the romper. To create said flowers, I drew a shape similar to a daisy in Illustrator and sent it to the Engineering Lab. There, I laser-cut the flowers out of organza and poly-satin. Perhaps the most challenging part of this garment was finishing off the legs and lining. I had to hand sew the legs together and then hand sew the zipper to the shell and lining. The end result was well worth it.



Spring Affair

Designed by Jacob Dial

For the skirt, I wanted a feminine silhouette that was exaggerated at the hips without billowing out in the front or back. I began by sewing three rectangular pieces of intricately woven cotton fabric together and basted layers of crinoline along the waist. I then gathered as much as I could at the side seams and placed it on a dress form to make adjustments. The gathering was extremely tight at the sides, making the exaggerated silhouette I wanted. For the waistband, I sewed two white poly-satin ribbons together and attached them to the waist. I added in horse hair along the bottom to achieve a delicate waviness. Altogether, this timeless piece is perfectly created for any event; from a wedding to a coffee date.



The two pieces in this set meld into each other seamlessly due to the use of intricately woven cotton for both pieces. The use of woven yarns on the romper allows for the slightest differentiation, making it unique. The use of pastel yellow allows the outfit to be paired with a multitude of colors and accessories that can change the look drastically.



Yellow buttercream frosting is the first thought that comes to mind upon viewing the skirt and romper combination. Others might be, daffodils, innocence, spring, posh, and classic. It was my intention that this piece be unassumingly beautiful. A “makeup free” look if you will. There is no glitz but all glamor. Although many of my designs are quite risqué, I wanted to tap into a softer forgotten side of mine. Gardening and enjoying the simpler things in life. I grew up gardening with a love of landscaping. On a trip home in early March, I was inspired by the blooming daffodils I had planted years ago. I also drew inspiration from two of my favorite decades: the 60s and 70s. The skirt combined with the romper allows for an early 60s look similar to those of Diana Ross and the Supremes. Once the skirt peels away, you are left with a more psychedelic floral look of the 70s.

In Bloom

Designed by Jordan Spears

Selected Design on exhibit at the 2022 ITAA Conference



In Bloom is a zero-waste garment featuring an original digitally engineered print. It was inspired by the work of Vincent Van Gogh's *Almond Blossom* painting. My design reflects the movement present throughout the painting by the flow of the draped piece that moves from the upper left of the body down to the train. My inspiration is from the Immersive Van Gogh Exhibit where all of his art was projected around a room and flowed from one artwork into another. The scenes shown with the *Almond Blossom* painting were breathtaking. I wanted to take the branches, cut them apart, and splice them together to create my own work.

The challenge was to make a zero-waste garment by cutting down on the excess material thrown out during the cutting process. I also chose to use an organic cotton sateen fabric. After countless hours of creating and recreating pieces to ensure that my print would be correct, *In Bloom* was created.

This garment represents movement as the branches and flowers circulate down and around the body. The main base of the dress is simple and generally without movement, while the pleated attachment is full of movement and life. The tree branches bounce as the wearer walks and the train flows behind. The basic silhouette, large pleated train, and movement caused by walking makes this piece visually appealing and impactful.

Draping and precision pleating are central to the creation process. First I created initial sketches, as well as the initial draping of the muslin garment. I wanted it to have movement and be rather eye-catching. I went to both the Andy Warhol Museum and the Immersive Van Gogh Exhibit for inspiration. I was drawn most to the work of Van Gogh.

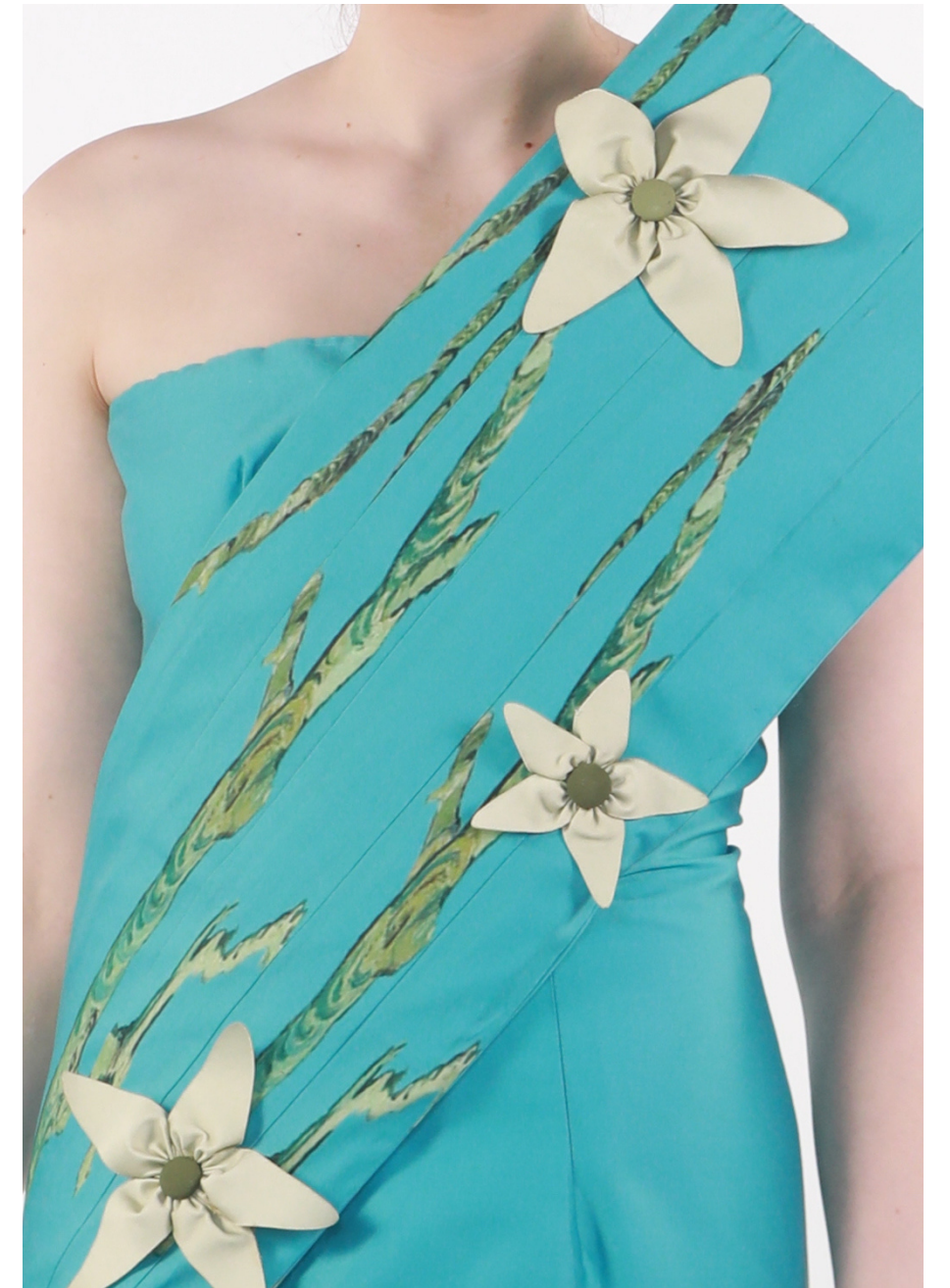
I created different preliminary muslin designs that allowed me to test creating the individual pieces in order to not waste any fabric. I landed on making every piece a rectangle, to get the exact look I wanted. Then, the engineered print was designed to fit within these rectangles. I placed flowers of different sizes onto the pleated section, while still using up all of the fabric. I landed on making the flowers from strips of fabric that I laser cut, ensuring they were all uniform.



In Bloom

Designed by Jordan Spears

Many setbacks forced me to have to stop and think before completing steps. In working with the organic cotton sateen fabric, I learned that a removed stitch left small markings in the fabric. I had to stitch exactly over the previous stitches or there would be tiny holes in my fabric. I was able to cover previous stitch lines with new ones. Another difficult part of the process was pleating. I had to measure and re-measure to ensure perfection before creating final measurements and prints before determining one that I loved. Every detail in this design is intentional. Mistakes happen and I had to incorporate them into my design.



In order to have my garment flow into itself, I kept the dress portion basic, so it draws the eye to the large pleated train. The movement of the train showcases the billowing of tree branches in the wind.

My design focus incorporates an art piece that is commonly known. I brought the emotion that *Almond Blossom* evokes into my design. This garment forces people to look at the branches on the dress and reminds them of the first feelings they got when they looked at Vincent Van Gogh's work.

French Flare

Designed by Madison Hess

Selected Design on exhibit at the 2022 ITAA Conference; First Place Most Inventive Transformation Award at the 2022 Annual WVU FDM Fashion Show, "The Standard".

French Flare is inspired by the elegance of the conquest of the new French time period. In 1760, the Toile De Jouy print represented the French landscapes, sceneries and figures in a delicate style. The toile pattern is one of the most timeless fabrics in history, continuing to be used for garments, interior decorations, and even wallpaper. The purpose of the design was to take the history of the toile print and turn it into a wearable gown. The challenge was to feature an element of transformation in some way.



The green color of the delicately drawn figures and landscape of the toile against the light cream makes the print pop. The way the dress transforms with the sleeves and cape coming off at the same time gives the viewer the strongest visual impact.

The garment features a cinched bodice, displaying a slight sweetheart neckline and a skirt that hugs the body while lightly trumpeting towards the bottom. I decided to add a beaded scarf that from afar looked similar to a dangling necklace.

As the viewer looks closely, the edges of the princess seams almost match the print on the next side, creating a cohesive look within the bodice. Seen from afar, the look is shadowed by a long draping cape scattered in the same toile fabric.



The Toile De Jouy was used for heavy upholstery, wallpaper, and cotton garments.

Incorporating originality, I changed the narrative and chose the lighter chiffon instead of a heavyweight fabric. This was also important to the way the garment fit and flowed while the model was in motion. I chose the scarf instead of a choker due to the look from the back of the model.

Purple Reign

Designed by Chelsea Hidalgo



Second Place Most Unique Interpretation Award at the 2022 Annual WVU FDM Fashion Show, "The Standard"

Purple Reign is a zero-waste garment that utilizes digitally engineered printing techniques. There are two engineered prints incorporated into the design. First, the top in this ensemble consists of a color gradient designed in Adobe Illustrator. Second, the skirt print comprises photos of wisteria flowers to create a textured look. The design is a unique interpretation of blooming wisteria vines and their many shades of purple. Finally, Purple Reign qualifies as zero-waste due to the precise draping and measurements taken to utilize every bit of fabric. The sizing must be pristine to avoid fit issues and fabric waste.

This look is eclectic, romantic, and bold. The design concept derives inspiration from a diverse range of sources. The original inspiration is from a wisteria tree's unique twining vines and flowers. After experimenting with different fabric manipulation techniques, I utilized classic braid, giving the top dimension and texture.

The opulent era and the regencycore aesthetic (an aesthetic or trend based on signature pieces, silhouettes and looks from the United Kingdom's Regency era, which ran from approximately 1811 to 1820) inspire me, exemplified with the high neckline similar to that of a queen.

The high neck adds drama and volume to the top. With the textured top, went with a straight skirt to balance. Though the bottom isn't incredibly detailed, I wanted it to be equally exciting. I chose to print actual wisteria vines on my fabric to continue the braided texture of the top. Using color matching technology, the color gradient on the top came straight from the photos of the wisteria on the skirt. Aesthetically, the Purple Reign ensemble has dimension, drama, and balance.

Measurements: I braided long strips of fabric, draping them on a dress form, deciding on placement and length for the

three sections of the top. I then took the pieces off the dress form and measured precisely. I re-draped them on the form a final time. After creating the top, I decided the length of skirt.

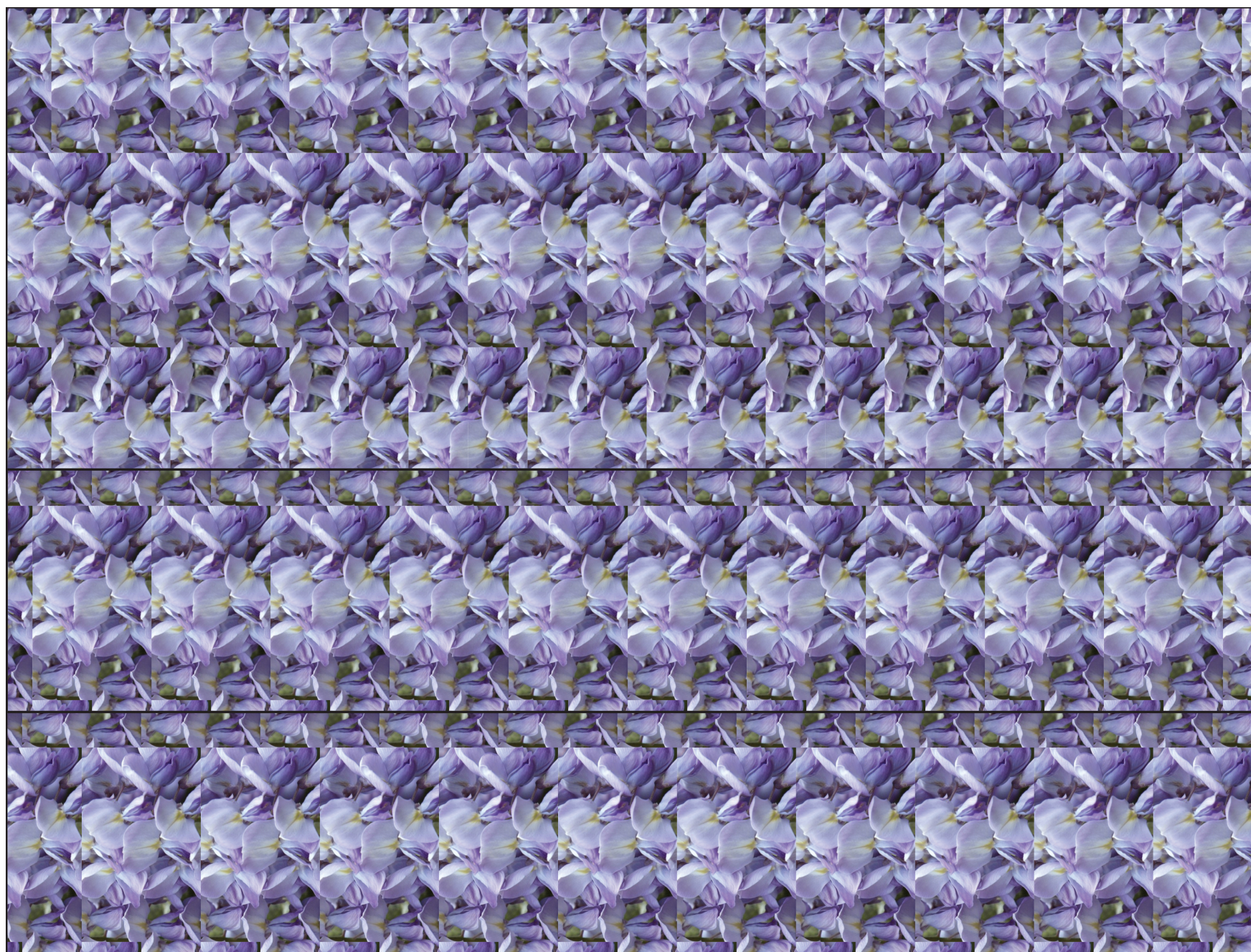
With measurements, I draped two rectangular pieces of fabric on the dress form and put darts at the waist of the front and back pieces of the skirt. I measured each piece and accounted for seam allowances. Lastly, I created a muslin with exact measurements to ensure the fit was just right and I wouldn't have fabric waste.



Purple Reign

Designed by Chelsea Hidalgo

Cohesion: The design utilizes engineered print fabric to create balance and cohesion. The top is dramatic, while the skirt is simple and chic. Both pieces incorporate four shades of purple to create dimension and color balance. With the top being so textured, I knew I needed to do a straight skirt so I wouldn't overcomplicate the design. However, I wanted the skirt fabric to be equally as unique and eye-catching, so I chose to print actual photos of wisteria vines. The skirt print acted as a subtle continuation of the top. Overall, the design achieves a sense of drama while being balanced and cohesive.



Originality and Innovation: Purple Reign stands out because of its unique fabric braiding technique, utilization of digitally engineered printing, and balanced use of purple shades. The threading method used to weave the braids together was innovative for fabric because it is a

technique used on hair called African threading. African threading is a tradition among women in parts of Nigeria, Ghana, and Sub-Saharan Africa. Generations of black women have used African threading to style their hair and straighten it naturally. Overall, the design is original and innovative because it captures your eye with its use of texture to add drama, dimension, and volume while being visually appealing.

New York Nights

Design by Peyton Burford

First Place Most Unique Interpretation Award at the 2022 Annual WVU FDM Fashion Show, "The Standard"



New York Nights is a zero-waste garment utilizing digitally engineered prints from photos taken of New York City over the past five years. The garment highlights the different parts of New York City that define what the city means to a specific person. This design was created to push the boundaries of a single garment by creating a four-in-one look while also following the idea of zero-waste. Each separate piece of this design was created through squares and rectangles and placing darts where needed to give the garments a more fitted look. Measurements of each piece were a key component to the success of creating this look and even the

slightest discrepancy would throw off the entire fit of the garment. In this one garment, there are three separate pieces that have the ability to be worked together or separate in different ways. The combinations of the top, skirt, and pants give the wearer the options to wear the one garment four different ways. The first option is as a top and a pant, the second option is as a top and a skirt, and with the added element of the zipper on the bottom of the top and the top of the skirt it allows those two pieces to become connected into a dress, the final option is to wear all three pieces together to utilize each piece. It is ever changing just like the city. An engineered print was used through photographs I have taken of New York over the course of the past five or so years. Images of taxis, newspapers, the subway, buildings, and Yankee Stadium appear throughout the different sections of this garment to grab the attention of anyone who is looking at it. Measurements were the key to the success of this garment. Since it was zero-waste, the patterns developed could not have a curve to them which is why the square method was utilized in the creation of New York Nights. I started by measuring the dress form to get the basic measurements then worked on editing them to get the garment the way that I envisioned. The easiest way to start this was by using twill tape so that I could see how everything would lay on the dress form hypothetically. From there, I worked transferring those measurements into my muslin pieces. I went through about three different muslin attempts before I had finally gotten the garment to look how I wanted it to.



New York Nights

Design by Peyton Burford

Once the measurement and muslin were nailed down, the digitally engineered print had to be put into place. Using my final measurements from my muslin, I was able to use Adobe Illustrator to put the prints into their designated, put them into production, and ordered them. Since the pieces with the prints were being used for the outer layer of the garment, I began working on the lining until the fabric was delivered. Once the printed fabric was delivered I began constructing the outer layer and then attaching to the liner. Zippers were also a key component of this garment; the center pieces in the front and back of the skirt both have zippers between the outer layer and the lining as well as a zipper being added to the top a skirt to make them attached or detached. (8) The final detail was adding the back straps onto the top so that when worn separately it held its shape.

Change is consistently happening within the fashion industry, within people, within places. The city is seen as ever changing, from the people, to the clothing, the cars on the street. New York Nights changes depending on a person's mood and personal desires to match the world that is changing around them daily. All while showing parts of New York that we hope will stay the same even though there is always change happening around them.

While the industry has seen other interchangeable designs, most of the time it is only for one single piece. This look challenged the idea of convertible pieces into a fully convertible ensemble, and while other designers in the industry have done similar things in the past a lot of them tend to be avant-garde and not something the everyday person would like to wear. New York Nights challenges that idea.

