

Sorbet Sunrise

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Keywords: 3D Knitting/WholeGarment® knitting, Engineered Textile Design, Apparel Automation

1. Contextual Review and Concept Statement

Sorbet Sunrise arose from experimentation using three innovative technologies which have the ability to create entirely new production streams and design workflow in the textile and apparel complex. All processing steps to create this sweater used technology by Shima Seiki, a leader in flat-bed knitting technology. The technologies employed were first, the ApexONE software which guides the user through a series of steps to select various silhouettes for knitting; next, the actual knitting of the seamless garment on a MACH2X SWG-X 8-gauge machine; and lastly, the engineered digital printing using the SJP-160 Flat-Bed Product Printer. WholeGarment® knitting is recognized for its ability to have all making up of a product conducted on the knitting machine, eliminating the need for seaming equipment or a labor force to join garment pieces together (Ma & Lamar, 2013). Combined with a flat-bed printer, design capabilities are virtually endless. This technology allows a graphic design to be applied to textile materials which cannot easily feed through a roll-to-roll digital printer (Chapman, 2016). By combining these technologies, a customer has the potential to purchase a highly individualized product through customized fit, silhouette and applied graphic design. This individualized attention for a customer, also known as mass customization, has posed an issue to the apparel industry with its traditional method of production (Nayak, Padhye, Wang, Chatterjee & Gupta, 2015).

2. Aesthetic Properties and Visual Impact

Shima Seiki's ApexOne KnitPaint software allows for quick iterations of garments through an automated silhouette system. Most sweaters which are present in this system are knit off the machine starting with the hem and finishing with the neck, where knitting is oriented in the vertical direction. The silhouette of a sweater knitting in this orientation is limited by the needle bed width. An update to the KnitPaint software allowed for a change to this knitting orientation, to knit in the horizontal direction. In this method, the knitting begins at the hem of one sleeve and ends with the opposite sleeve hem. The advantage to this knitting way is to create designs with greater increases and decreases in knitting, resulting in a more extreme pitch for pattern

shapes. This allows for a greater ability for draping within the garment shape. The resulting garment has a bat-wing type sleeve with a pleasant cowl that drapes from the hem of the sleeve to the waist. Though the overall drape of the garment is the most eye-catching feature of the structure of the garment, a series of pointelle stitches were added along the top of the sleeve to accent this line of the body and to complement the print.

To further push the bounds of this design, a graphic design was applied to the sweater using the Shima Seiki flat-bed product printer. An engineered design consisting of rhomboids was developed using Adobe Illustrator, with individual hue gradations in each tile. Each tile was then placed in such a way for a larger ombre to encompass the entire garment from the hem to the neck. The print design was inspired by the pastel color forecasting for Spring/Summer 2016 by WGSN.

3. Process, Technique and Execution

Sorbet Sunrise is considered an engineered textile design, defined by Chapman & Little as “a process or product where the fabric formation and/or fabric design is/are produced simultaneously and/or purposely for the end product. (2012)” In this technique, the form of the garment and fabric surface were controlled by the designer. Several processes were used in the creation of this garment including the initial trend research using WGSN; mocking-up of the graphic design using Adobe Illustrator; developing the garment silhouette and knitting file using the ApexONE software; knitting the garment on the MACH2X machine; scouring and pre-treatment prior to digital printing; then finally printing of the garment with the Shima Seiki flat-bed product printer, followed by steaming and a final washing. The sweater was knit using two ends of 100% cotton 20/2 open-end spun yarns. As this was a highly automated process, much of the hands-on work consisted of time on the computer for programming of the design (knit structure and graphic) and prepping the garment for printing and post-printing requirements. This experimentation was quite successful due to the diligence taken during the pre-printing and post-printing steps to scour all residue on the garment, so the pre-treatment solution could thoroughly penetrate the cotton yarn.

4. Cohesion

Sorbet Sunrise has cohesively combined several automated production processes to demonstrate a new production method for the apparel industry to consider. By eliminating the need for cutting

and sewing, a significant reduction may take place for labor requirements. It is now possible to develop knitted garments that are not so constrained to the knitting bed width which expands the offering of silhouettes. By using the flat-bed printer, it is possible not only to create individualized designs for bulkier garments- but to seamlessly execute an engineered design from the front of the garment to the back. All of these techniques and technologies were used to create a highly engineered and seamlessly constructed garment.

5. Significance, Rationale and Contribution

The significance of this experiment is to demonstrate that the traditional apparel production process can be changed with innovative technologies. With WholeGarment® knitting technology, knitted garments may have knitted stitches strategically placed in areas of the body for design emphasis. The silhouette of the garment may also be changed significantly with the use of horizontal knitting and manipulating Shima Seiki's automated silhouette system. To further individualize a garment for a specific customer, a digital print can easily be applied to thicker materials using a flat-bed printer such as the SJP-160. This method of manufacturing requires a greater knowledge of technology for the operator, but the design opportunities are limitless. This creative scholarship contributes to the body of knowledge related to engineered textile design, serving as a test to combine fabric formation and fabric design processes.

6. Originality and Innovation

Sorbet Sunrise is an original WholeGarment® design consisting of a highly shaped silhouette using horizontal knitting. It also employs an engineered digital print, constructed by individually placing each gradient into the rhomboid shapes. This overall print combines principles of an engineered design and an overall design by consisting of many shapes that arrange into a larger ombre effect. Innovative technologies were essential to the success of this highly designed garment, including: Adobe Creative Suite, Shima Seiki ApexONE, Shima Seiki MACH2X SWG-X 8-gauge machine, and a Shima Seiki SJP-160 flat-bed product printer.

References

- Chapman, L. P. (2016). Digital Printing. *Textile World; Marietta*, 166(3), 32–36.
- Chapman, L. P., & Little, T. (2012). Textile design engineering within the product shape. *The Journal of The Textile Institute*, 103(8), 866–874.
<https://doi.org/10.1080/00405000.2011.615491>
- Ma, Y., & Lamar, T. A. M. (2013). Three-dimensional Shaping for Knitted Garments. *Research Journal of Textile and Apparel*, 17(3), 128–139.
- Nayak, R., Padhye, R., Wang, L., Chatterjee, K., & Gupta, S. (2015). The role of mass customisation in the apparel industry. *International Journal of Fashion Design, Technology and Education*, 8(2), 162–172. <https://doi.org/10.1080/17543266.2015.1045041>

