Pixie Flower

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The objective when designing this fully-fashioned garment, titled Pixie Flower, was to explore visual color mixing in electronic jacquard knitting. Visual color mixing was employed in this research to optimize the amount of colors that can be achieved with a four yarn color machine set up. In jacquard knitting, each additional yarn color adds time and cost to the product development process, due in part to yarn dyeing and the need for an additional yarn carrier for the knitting machine set-up.

There are two primary ways to mix colors; the *pigmentary* method of color mixing, where two colors are mixed together producing an entirely new color, and the *visual mixing* method which consists of juxtaposing pure colors in a dot formation to produce the appearance of a new color. At a distance the human eye merges the colors into a single color, but from a magnified view the separate colors are clearly seen. Itten (2004) states that one advantage of visual mixing is that tones appear more vibrant and less diluted when compared to the pigmentary method. Process color printing is an example of visual color mixing. A typical four color print uses various dot formations of cyan, magenta, yellow and black to create an image. The eye interprets the mixture of colored dots and an image is produced. This printing method is able to yield a wide variety of colors using only four ink colors: cyan, magenta, yellow and black. Jacquard weaving also uses the *visual mixing* method. In jacquard woven design, color areas are formed by using a variety of different weave structures to vary the percentage of dyed warp and weft yarns that appear on the surface of the fabric (Mathur, Hinks, Seyam, Donaldson, 2009).

For this digital color design exploration, principles of jacquard weaving and process printing were applied to jacquard knitting in order to produce a color gamut suitable for production on a 7 gauge knitting machine. Basic weave derivatives of plain, twill and satin structures, stored in the Lectra Kaledo Weave library, were evaluated based on the percentages of yarn surface exposure. For example, a simple plain weave repeat would use equal amounts of two colors; while a 3/2 twill weave repeat would consist of 60% of one color and 40% of the other. Ninety repeat patterns were brought into Lectra Kaledo Print and stored in the motif library. Knit samples of the following five color palettes were prepared and knitted using the 90 repeat patterns; A) orange, blue, gray, white, B) yellow, blue, black, white, C) yellow, green, blue, white, D) red, light purple, green, orange, and E) red, light purple, green, blue.

After visually assessing the knit samples prepared using the five color palettes, the designer decided to use color palette D, the red, purple, green, and orange yarns. Palettes A, B and C used

at least one yarn that was white, black or gray and so did not produce as high of a color contrast as palettes D and E. Due to the fact that the blue and light purple yarns of color palette E had similar values and chroma, once knitted, this yarn set also produced a smaller range of contrasting colors.

A subset of eight colors, four pure yarn colors and four visually mixed colors were chosen for the jacquard design. Using Lectra Kaledo Print, the design motifs were engineered within the shape of the knit garment so that the design flowed seamlessly from the front to back of the dress. The pure colors and visually mixed colors were filled into the motif shapes using a motif paintbrush fill. The ratio of one pixel equaling one knit stitch was maintained throughout the CAD process.

The CAD file was transferred to the SDS One Shima Seiki system and prepared for knitting. The double knit, birdseye back design was produced on a Shima Seiki SES 7 gauge fully fashioned knitting machine using four ends each of 50/2 100% mercerized cotton yarn. In fully fashioned sweater production, shaping occurs during the fabric formation process by movement of loops at the fabric edge (Brackenbury, 1992). This narrowing and widening process forms perfect selvedge edges that contribute to a high quality, durable seam. After knitting, the front and back fully fashioned garment panels were washed, steamed and blocked before linking together to provide a highly extensible, flat seam.

Garment: Bust 35.5” Waist 29” Low hips 36” Overall CF length 36

References

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