

Engineered Digital Textile Print Design for Customized Curves

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ABSTRACT

There are various instances when women feel the need to wear clothes for a slimmer appearance than their actual body shape. Looks and body appearance provide self-assurance to people, especially to those who are in a business related to physical appearances. Physical fitness and appearance have taken a parallel path in today's world. Many designers have experimented with garments providing body shape deceiving and illusionistic effect through meticulous use of solid colors, slimming patterns, and illusion print designs. This research paper explores how smart edits in print design provide aesthetics blended with engineered slim looks, enhancing and customizing curves, per consumer preference, to create body size adjustments visually. The creative edits can be efficiently used for creating one piece/single garments customizing the curves and visual body shapes in synchronization with digital print design to enhance the body in a considerate manner.

Keywords: Digital print and pattern, slimmer look, printed garments, customized curves

Digital engineered printed textiles and customization opportunities

Digital technology opens up a door of possibilities and opportunities for designers, manufacturers, and business owners in various fields related to printed garments and textiles. Breaking the limitations of repeat and number of colors per design; engineered design layouts, offer newer possibilities of shorter minimums and quick turnaround time (Ujjie, 2006). Engineered print design possibilities and quick turnaround times are crucial to the customized products, making them effective in terms of designing opportunities, quick production and product delivery.

Understanding customized curves

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Examples from optical slimming design garment (Figure 1 A, 1B and 1C) are used for highlighting the body curves and creating a slimming illusion. These garments are created by effective use of dark and light color placements making the waist area appearance slimmer. The techniques of pattern cutting and placements of colors are used in the garments, and positioning colors and patterns in a considerate manner creates an illusion (Dean, 2012). A similar concept may be explored in print design using design variants other than combinations of solid dark and light colors to create slimming effects in garments. Digital printing technology offers a customization opportunity and choices for individual preferences.



Figure 1A, 1B, 1C: Examples of slimming one-piece dress (Style.com, 2012)

The types of slimming dresses shown above (Figure 1A, 1B, 1C) are suitable for a larger bodied woman and provide the flexibility to look slim without needing to change who they are, instead, emphasizing how they dress. Cas Boutique DC is a designer boutique, owned by designer Maggie that offers custom-made garment design services. Designs and garments are created as per the body shape and consumer requirement to reflect the perfect look that suits the body and enhances perceived value (Jordan, 2010). There has been a remarkable change in the area of custom clothing after the rise of digital technology. Many initiatives have been witnessed throughout the fashion and garment industry in utilizing various aspects of digital technology such as 3D scan for different body types. The reverse engineering technique is used to create 3D models for garment fitting. Virtual mannequins are used for pattern cutting and visual trial in a virtual setting to modify the designs as per consumer need and desires (Pecoco, Galantucci, & Lavecchia, 2011). E-Commerce offers various design solutions; 'CreyateStores' by Arvind Internet offers customized men's clothing for evolving online consumers (Mohan, 2014). Customization has been offered for digitally printed garments by online brands such as spoonflower.com for fabrics and constrvct.com for garments globally.

Research objective

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The objective of this research is to explore variants in digital design and use of digital tools to offer creative design solutions for smart editable customization opportunities in slimming single piece garments. The target audience is women and the designs represented in this paper deal with the sensitive issue of women's appearance for fitted one-piece garments.

Methodology

The concepts used for customized curves and digital printing technology were studied by exploring the work of well-known designers catering to the specific need of consumers through customized clothing design, journals, and books in the area of customized clothing and digital printing technological advances and possibilities. Design experiments were carried out in digital form for consumer feedback/response. Three visualizations of standard single piece design concepts were created on digital software (Adobe Photoshop 6) using design variants such as shadow, color gradation, scale variation, and motif/pattern engineered placement. These design concepts were shown to women for feedback using a semi-structured questionnaire research tool.

Understanding curves and scope for customization

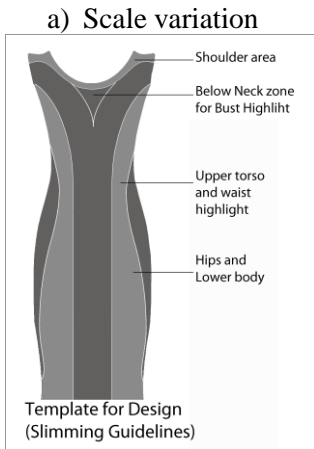
Fashion has certainly addressed the need for slimming body appearance in multiple ways. Caryl Franklin discusses the importance of medium size prints and patterns as the best choice to look slim. She explains that diagonal lines as compared to straight lines highlight the body to look slimmer (Franklin, 2011). There are ample references available for highlighting various body types through utilizing different garment types, color choice, and print and pattern design. These resources include designer label, online brands, and customization services. However, digitally printed engineered garments offer diversified elements of design, colors, and patterns for customizing curves in a garment. Customized curves address the needs for shoulders, bust line, and

waistline. People have different body shapes, popularly known as brick, pear, apple, vase, etc. (Squirelly, 2012). According to the research conducted in 2010 by researcher Andrew Hough; the hourglass shape is the most desired among the different body shapes (Hough, 2010). The hourglass, or perfect curvaceous body appearance, depends a lot on the way curves get highlighted in a dress.

Exploring digital print design on one piece garment & effectiveness of digital tools

It was observed through the study of existing designs that a few variants contribute effectively to create a slimming appearance in a single piece garment. The following four variants were considered while exploring design concepts for single piece garments.

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b) Shadow c) Curvilinear shapes d) Motif/Pattern placement

Figure 2: Template for Slimming guidelines

The curve zones are indicated in a single piece garment as explained in Figure 2.

Design Template highlights concern areas of the body. Design variants such as shadow, scale variation, and pattern placement may be used strategically to create effective results following the indicated areas in dark grey color.

DESIGN SECTIONS ARE CREATED AS PER THE TEMPLATE GUIDELINES ON SEPERATE LAYERS
 (Basic design elements such as Dots (3 scales), Shadow, and color distribution has been explored)

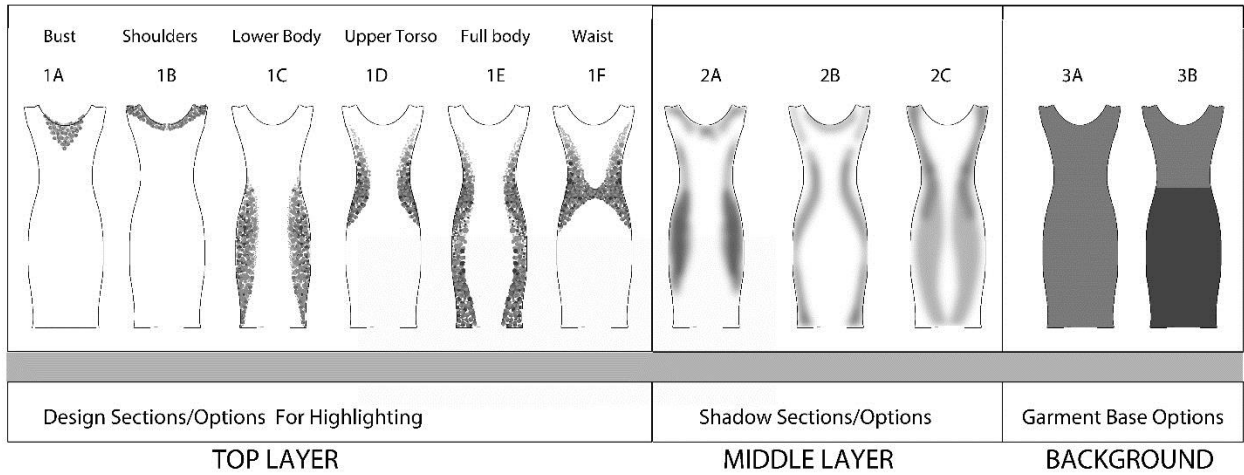


Figure 3: Design segments for highlighting/slimming body parts

In Figure 3, basic design element dots were used in the top layer to create different segments for highlighting/slimming body parts indicated in the template (See 1A to 1E). In the medium layer three segments created using shadow (See 2A to 2C). Finally, in the base layer, a medium color of

the base fabric was used. In each case, the design segments were created keeping in mind that each segment coordinates with the other and compliments the garment as a whole in different permutations and combinations (as shown in visualization Figure 4: Design Possibilities).

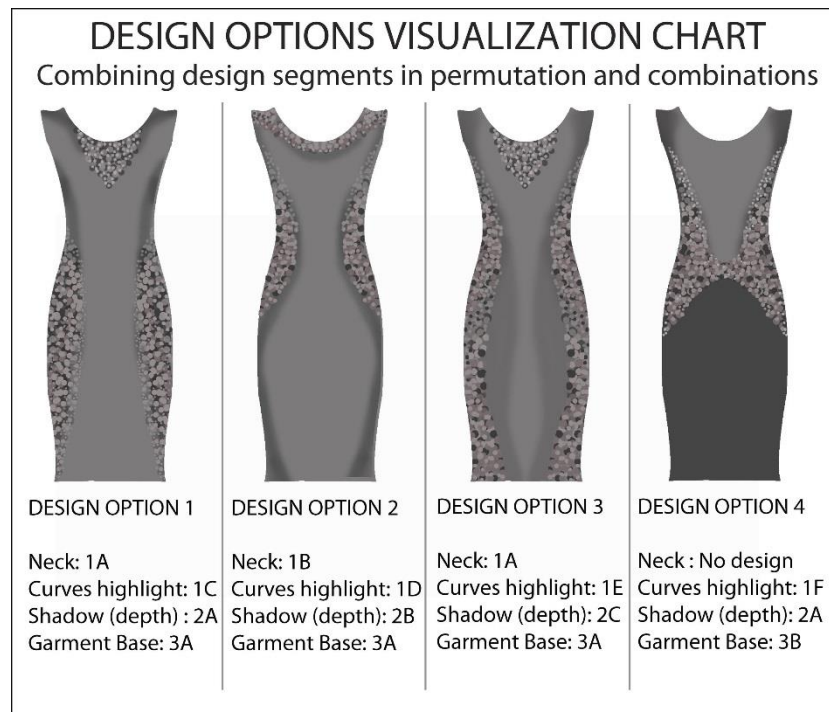


Figure 4: Design Possibilities

Figure 4 depicts three garment design possibilities using permutation and combinations of design segments from Figure 3. The segments when combined as permutation and combination; offer multiple design choices as per consumer preference. The number of design option possibilities depends on the possible number of permutation and combination segments and elements created by the designer.

Two-dimensional draping was done on the standard pattern of a single piece garment to visualize slimming effect. Further, the customization process was explored through various online resources to understand and establish the links of producing design options as per consumer requirements. The slimming requirements and segmentation design options were discussed through a semi-structured questionnaire with women respondents.

Discussions and feedback

The questionnaire respondents were 30 Indian females between the ages of 18 to 35 years. It was assumed that Western garments would be preferred in this group of consumers, as per studies carried out by Cygnus Business Consulting and Research

(2004). This study shows that the preferences among college and working women demonstrate a greater preference for Western and Indo-western apparel (Cygnus Business Consulting and Research, 2004). The respondents were given a small presentation about body type and customization. Further design explorations (Figure 3 & 4) were shown for feedback. The feedback was collected through an open-ended questionnaire research tool. After obtaining the feedback from the respondents; the qualitative data were analyzed based on Kruger's (1994) qualitative analysis of data. The analysis was done based on descriptive statements and its interpretation.

Profile of Respondents

- Total Respondents: 30 (9 Medium, 6 Large and 5 Extra Large)
- Age group: 18 to 35 years (studying and aspiring for a professional course/career or working. 18 respondents were representing age group 18 to 25 and 12 respondents were representing age group of 26 to 35 years)
- Body type: Medium to Extra Large as indicated in the enclosed body measurement

Table 1: Body measurement table as per sizes indicated by respondent

	Medium	Large	Extra-Large
Bust (inches)	34"	36"	38"
Waist (inches)	28"	32"	36"
Hip (inches)	38"	40"	44"

Table 2: Respondents feedback and response analysis

Response Questions	Respondents Preferences	Factors for preference
Preference for slimming appearance garment	66% women preferred slimmer look printed garment among young professional	Slimming garments projects fitness, provides feel-good factor, and boosts self-confidence
Preference of patterns vs. Solid and textured surfaces	68% women prefer print and pattern to the solid and textures	Print designs offer unification of diverse elements in one garment thus creating surface interest
What does the customized slimming garment offer	65% women prefer the customization of the slimming garment	Women prefer the customization of slimming garment due to several reasons... <ol style="list-style-type: none"> 1. Personalized design choices 2. Slimming physical appearance 3. Suitable option for people who cannot frequently exercise due to hectic schedule or medical/health reasons 4. As an instant Solution for certain occasions and time period
Consumer expectation from the customized slimming dress in terms of DESIGN	55% consumer prefer print and pattern, 27% prefer solid, and textures and 23% consumers are comfortable with all types of design options	Consumer is looking forward to engineered design and style options and variety in color way
Consumer expectation	56% respondents inclination is towards having a comfortable ordering system with good visualization feature	Consumer preferences include: <ol style="list-style-type: none"> a) a comfortable online solution for customization b) 7 to 10 days product delivery time c) Online interface for easy and smart edits
Other concerns or expectation	Time and price concerns are expressed by 45% respondents	The major concerns are <ol style="list-style-type: none"> a) Time b) Cost
Other comments	Customization as a participatory design solution	Consumer prefers smart edits available for re-designing the garment and instant visualization It offers participatory design edit to consumer without having designing skills

Based on the consumer feedback, a basic framework for the customization process was designed in digital format. The basic framework includes three variants: a) Design segment options based on a common motif/pattern/theme on Top Layer, b)

Shadow/color gradation on the middle layer, and c) Fabric base color on the lowest layer.

Permutation and combination of the above variants a,b,c creates multiple choices for consumer selection. The permutation and combination generate creative possibilities

within a single design concept; designed strategically in segments. Smart edits in the online framework make the design process interactive. It provides freedom and simple editing solution to the consumer from a non-design background. Figure 5 illustrates the customization framework is a *conceptual framework* for online digital solutions for

instant visualization and order placement for one or multiple garments. Smart edit options may be built into the online system with technical support. The enclosed conceptualized model represents a basic framework for customization with smart edits for one piece slimming printed garments.

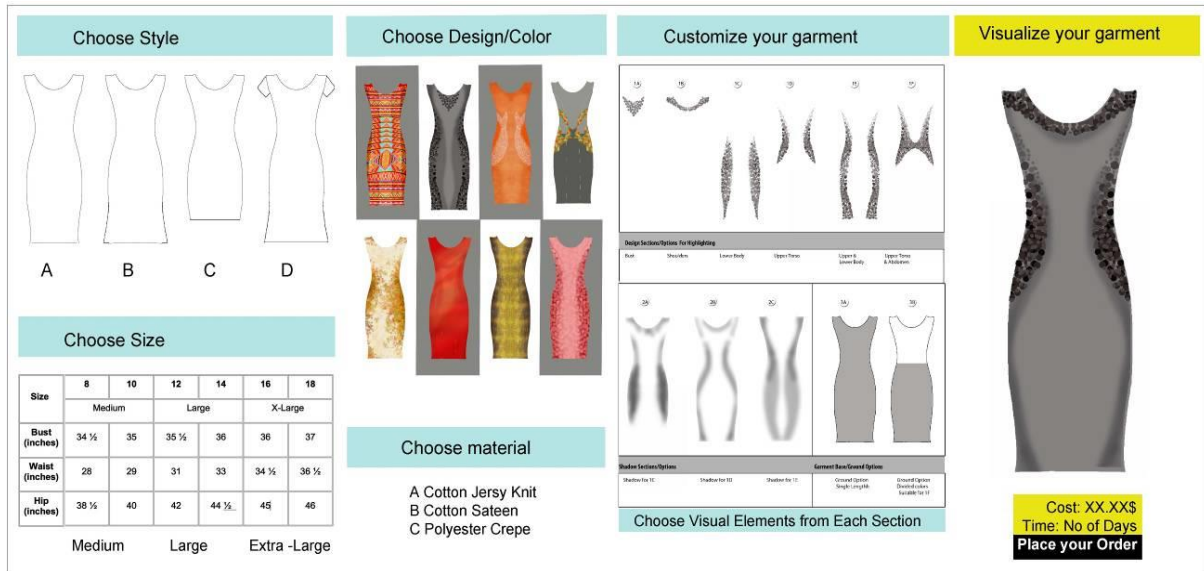


Figure 5: Conceptualized framework suggests smart edits for customization, design variants, consumer interactive online interface, and effective visualization for making informed choices.

Customization and printing process

Using digital technology, designers can easily arrange the design segments as per size and position of pattern. Design segments may be created as per garment style and printed using high definition digitally printed fashion (N.A., 2014). The printing for customization may be done with various online service providers such as *Spoonflower*, *First2print*, *Constrvct*, *InkdropsPrinting*, and *Fabric on Demand/Karma Kraft*. Since garment patterns are simple, stitching time and cost shall be reasonable. The garment pattern shall be a part of the digital artwork integrating the seam line for efficient cutting and stitching (Polvinen, 2012). A collection of designs may be displayed on the website and

depending on consumer selection of design, style and size specifications and ready designs can be edited with minimal time consumption by consumer. Upon placing an order, edited designs may be sent for printing and stitching. The product delivery is the final step of this process.

Conclusion

The scope of creating customized printed garments is enormous. Researchers are recommending that designers/retailers/brands who address the needs of professional women will demonstrate better profitability (Batra & Niehm, 2009). Consumer needs are becoming more specific, as per body type, personality, professional image, and cultural

environment. Engineered layout possibility in digital design is pushing the boundaries to encompass newer opportunities in printed textiles and fashion. It propels us to explore newer methods of conceptualizing printed garments. Today, printed garments are expressing far beyond themes, color palette, season, motif, print, and pattern; and consumers show a reasonable inclination towards the customization. The smart edit designing options proposed in this research paper are user-centric and interactive. The framework and design process discussed in this research paper provides smart customization opportunity to meet upcoming diverse consumer needs and desires.

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