

RE- INNOVATION OF HOME-DÉCOR: EFFECT OF PROCESS PARAMETERS ON DESIGNING AND DEVELOPMENT OF COMPUTER ASSISTED EMBROIDERED CUSHION COVERS

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Abstract: *The computerized embroidery process was investigated for the process variables as fabric type, motif parameters and embroidery thread, with their impact on the quality of the embroidered articles thus produced. Four sets of cotton based fabrics namely khadi, satin, velvet and Organdie with silk embroidery threads were used to experiment upon the suitability of the digital motifs along with their placement. Khadi fabric was the most suitable base for computerized work in terms of quality adjudgement parameters as fabric distortion, needle breaks, thread breaks, skipped areas and clarity index. Cushion covers were designed and developed as an interpretation of the custom designed respondent survey and costing evaluation was also carried out for the end- product.*

Keywords: *Clarity index, computerized embroidery, digital motifs, motif parameters, skipped areas.*

1. Introduction

1.1 Home textiles

Home Textiles refer to the textiles used for manufacturing home furnishings combining its functional as well as decorative entities. More the people long for decorating their surroundings with soothing colours and designs, more the textile manufacturers are increasing the production of interior textiles. A wide range of Home products- Carpets, rugs, Curtains, Table linen, mats, runners, Kitchen linen & accessories, Bathroom furnishings, Window Treatments, Hammocks, Bed linen & spreads, Blankets, Pillows & covers, Cushion & covers, Duvets & Duvet covers [1]. The textile fabrics most commonly used for home furnishings include Silk, Cotton, Jute, Rayon, Wool, Nylon, Polyester, Satin, Organza and Organdie. Furnishings turn the neutral spaces into personal and very special places. Textiles are the prime contributors in home décor products and thus, it must provide the texture, colour, character, scale and everything that is missing in the architecture as fabrics has many roles to play; it

brings style, reflects one's taste and controls the user's mood. Moreover, it is the most flexible component and can be easily changed, replaced or added to the interiors of spaces [2]. Fabrics increase livability and workability of a small spaces, acoustics, make music and even speech richer and more resonant. For getting all the advantages of fabrics used for home textiles, it must have peculiar properties such as light fastness, resistance to seam slippage, resistance to staining, pilling & snagging and flame retardancy [1].

1.2 Need of Home-Textiles

The home-textiles are mainly used for the enhancement of interiors, elegance of the surroundings, protection against weather (sunlight, dirt and dust), aesthetic appeal, value added effects as antimicrobial activity, aroma release & Ultraviolet protection and comfort of the users.

1.3 Requirements of Home- textiles

Home textiles should have good drapability, be skin friendly, durable for enough period of time, possess good tearing strength, wash & laundering fastness, good abrasion resistance and smooth to touch.

1.4 Categories of Home-textiles

The home Textiles can be broadly classified into five classes as seating textiles, window textiles, bed textiles, wall covering textiles and washroom textiles.

1.4.1 Seating Textiles

It refers to the upholstery fabrics that is stapled, tacked, glued or other frame and covers a reliant or hard. The choices of the fabric are often essential to create a quality and stylish look. Whether it is a contemporary or traditional workplace or home; Linen (Plain or striped linen & cotton, linen-cotton union, and cotton-hemp

union), acrylic and polypropylene are the popular choices along with boucle yarns.

1.4.2 Window Textiles

It refers to all the textiles employed in close proximity of the windows as Sun filters, semi-sheers, reflective textiles, curtain & drapes and blinds. Polyester, flax, cotton, wool, silk and acrylic are the common fibres used; voiles, woven nets, raschel nets, leno, piled fabrics, damask are preferentially used.

1.4.3 Bed Textiles

It include sheets, pillowcases, Quilted textiles, Blankets, Bedspreads, Mattress covers, Bed skirts, Bed comforters, Filling, Shell / Covering, Duvet and Bed throws to either conform to the interiors, hide few unwanted details or for comfort & warmth. 100% cotton, Polyester/cotton blends, silk, wool, acrylic, acrylic/ polyester blends, fleece, viscose and linen form the most common range of fibres used.

1.4.4 Wall covering textiles

Wall fabrics are fast taking over from wall paints in various convenient widths to be used in variety of room heights to avoid seams. Jute and Flax are the original choices with the sound absorption properties. Tapestries, Wall decorators, Wall hangings (embroidered & hand tufted) are the common textile articles of this category.

1.4.5 Washroom Textiles

Shower curtains, terry towels, bath mats, bath robes, bath rugs and shower caps form the crucial members of this class. Cotton, silk, microfiber,

wool, flannel, terry, and velour are the fibres used [3].

1.5 Techniques of home textile designing

The several techniques of designing home textiles include Printing, Painting, Tie-dye, Netting, Embroidery, Applique work, Tufting, Flocking, Weaving, Knitting and chinelle yarn based fabrics. Among the other techniques, embroidery is one of the contemporary methods carried out with the help of pre- set machines dependent on the variables as fabric, embroidery threads, motifs and end product to be produced [4].

1.6 Cushion & Cushion covers

A cushion is a soft bag of some ornamental material, stuffed with wool, hair, feathers, polyester, staple fibre, non-woven material, or even paper torn into fragments. It may be used for sitting or kneeling upon, or to soften the hardness or angularity of chairs or couches. A cushion is also referred to as a bolster, hassock, headrest and a sham. They can be placed on sun loungers and used to prevent annoyances from moist grass and biting insects. Different styles are available for cushion covers as printed, embroidered, with border designs or centre designs. Oil painting is also preferred for designing cushion covers [5-7]. Different shapes for cushions covers are square, rhombus, rectangular, round, wedge shape, doughnut shape, butterfly shape, heart shape and guitar shape. Wide range of sizes for square shaped cushion covers are 12*12", 14*14", 16*16", 18*18", and rarely 20*20" is also being used (Figure 1).



Figure 1: Styles of Cushion covers

The present work aimed at the investigation of the process variables namely fabric type, embroidery threads, embroidery speed and design selection on the quality of embroidery work thus produced for the design innovation of cushion covers by using the platform of a respondent survey. The evaluation of the computerized art-work was carried out in terms of co-ordination of the fabric with the motifs as well with the threads and also other embroidery dynamics [8-9].

2. Experimental

2.1 Materials

Four sets of base fabrics were selected for initial embroidery sampling with details as- Organdie (GSM~74.01, EPI & PPI ~ 94 & 70, Warp & Weft Count ~ 60 & 60), Satin (GSM~148.02, EPI & PPI ~ 84 & 50, Warp & Weft Count ~ 40 & 42), Khadi (GSM~229.43, EPI & PPI ~ 34 & 30, Warp & Weft Count ~ 16 & 39) & Velvet (GSM~296, EPI & PPI ~ 32 & 18, Warp & Weft Count ~ 10 & 13). Silk/Rayon based embroidery threads were used to be compatible with the base fabrics. Embroidery needle was selected with 14 number. Double head computerized embroidery machine (Make- Hoseki & Model- YN70-25) with machine rpm (3600), 18 embroidery needles and equipped with touch panel having features of user-friendly computerized designs, work % and co-ordinate systems was employed for the work (Figure 2).



Figure 2: Computerized Embroidery machine

2.2 Method

For the initiation of the work, a custom designed questionnaire was drafted to conduct a respondent survey of the sample population of age groups (18-23). The results of the survey were used for

the design & development of the embroidered cushion covers. After this, the digital as well as manual design presentation was carried out with Flat sketches, moodboard & storyboard by using Adobe Photoshop software (Version- 7.0). Colorways were created in four color schemes for each fabric type to check the co-ordination of fabric, designs and embroidery threads. After the initial sampling, the embroidery process was analyzed in terms of number of embroidery thread breakages as work % (TB), number of needle breakages as work % (NB), fabric distortion/ area (FD), Number of skipped areas/pattern (SA), Clarity index as compatibility of fabric-motif (CI). The analyzed results led to the development of the embroidered cushion covers.

3. Results and Discussion

3.1 Respondent Survey

The Questionnaire was developed by covering a wide area of questions on home décor, textiles used, shapes, size, motifs, designing method, embellishment type, types of embroidery threads, motif category and its placement for cushion covers. The survey had revealed that *cushions* are the textiles that form the main component of home- textiles. Sofa is the most suitable place for placing the cushions. Color schemes for the cushion depend upon the color of Interiors. Satin was the most preferred fabric for making cushion covers along with Square shapes. **18*18"** was the ideal size of squared shaped cushion covers. Floral motifs were mostly preferred for cushion covers by respondents. *Embroidery* was the preferential outcome of textile designing technique of cushion. Most users wished to have embellishment on the cushion covers.

3.2 Design presentation

The selected theme for the work was "Embroidered Garden". The moodboard was prepared digitally by the sources of inspiration taken from nature in the form of gardens while storyboard was based on the original developed embroidered samples from all the fabrics in various color ways. Different floral motifs were selected for all the fabrics to assess their suitability as flat sketches as shown in Figure 3.

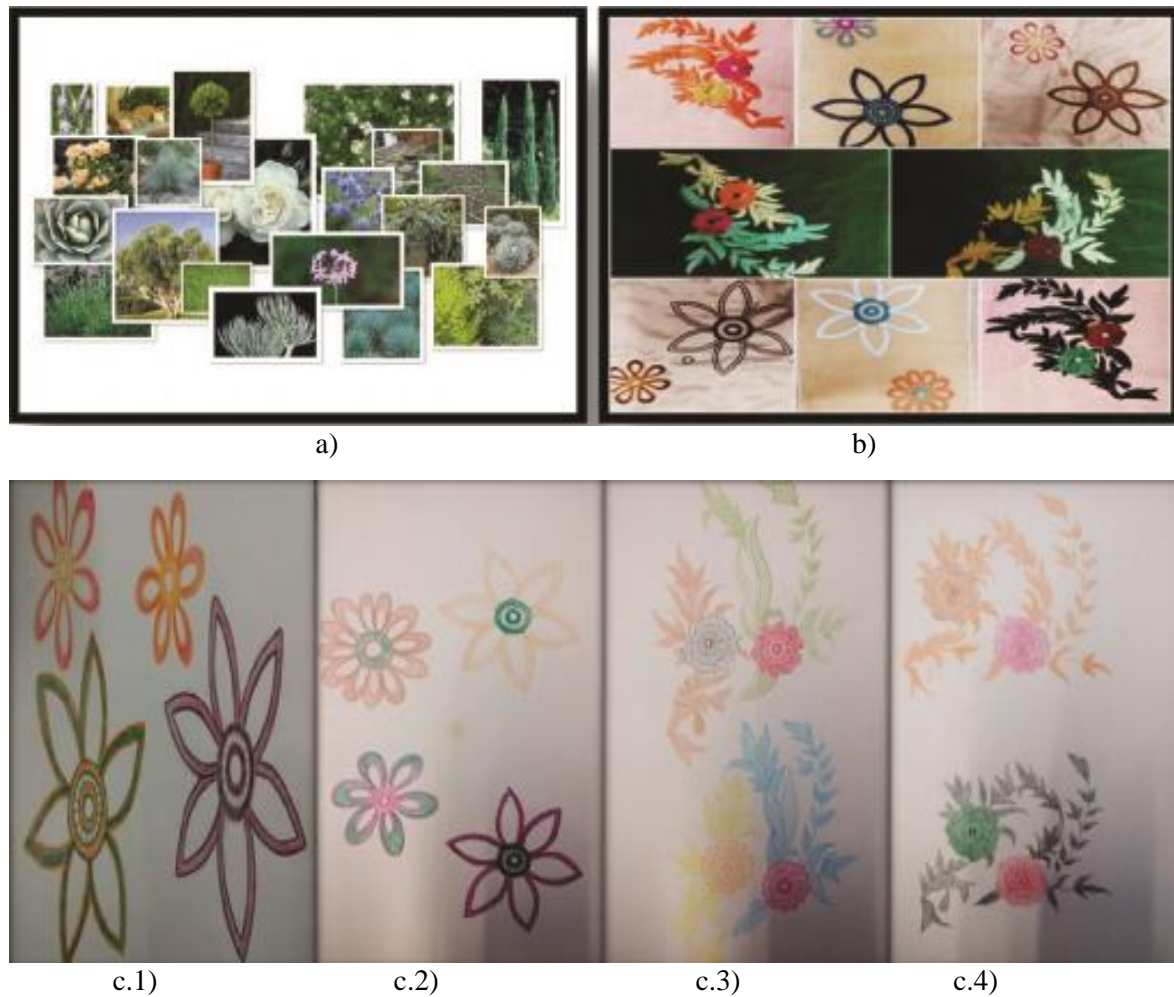


Figure 3: Design presentation a) Moodboard b) Storyboard c) Flat sketches for c.1) Organdie c.2) Khadi c.3) Velvet c.4) Satin

3.3 Embroidery Process analysis

The effect of process variables of embroidery was analyzed in terms of a number of dependent

responses as mentioned in Section 2.2. The analyzed results are depicted in Table 1.

Table 1 Analysis of Process variables of computerized embroidery

| Fabric – embroidery thread combination | TB | NB | FD | SA | CI |
|--|----|----|-----|----|-----------|
| Organdie- Silk | 10 | 0 | Yes | 3 | Poor |
| Satin- Silk | 17 | 0 | No | 2 | Very Good |
| Khadi-Silk | 2 | 0 | No | 0 | Excellent |
| Velvet- Silk | 31 | 2 | No | 6 | Good |

TB had shown that highest number of embroidery threads was broken in case of velvet due to the highest GSM & fabric thickness, in turn the incompatibility between the GSM of velvet and

embroidery thread. 16 threads were broken in satin because of the limpy nature of the fabric as it was difficult to maintain the fabric under proper tension on the machine under the embroidery

head. Least number of threads were broken during working with khadi as balanced weave was exploited in this fabric. The results for *NB* were observed as only velvet had encountered needle breakages due to the higher degree of needle penetration forces required to counter the fabric resistance. Organdie was ripped off due to excessive needle penetration into the light weight organdie and thus, the improper fabric- needle interaction as an indication of *FD* (Figure 4). Maximum *SA* was observed in velvet because of highest thickness of fabric (Figure 5), on the other, three & two were found in satin & organdie due to the instability of satin (Figure 6), whereas, fabric stiffness & lack of yarn displacement in organdie had led to the same (Figure 7). *CI* was the best for

Khadi and Satin in terms of fabric, motif and embroidery threads.



Figure 4: FD - Organdie

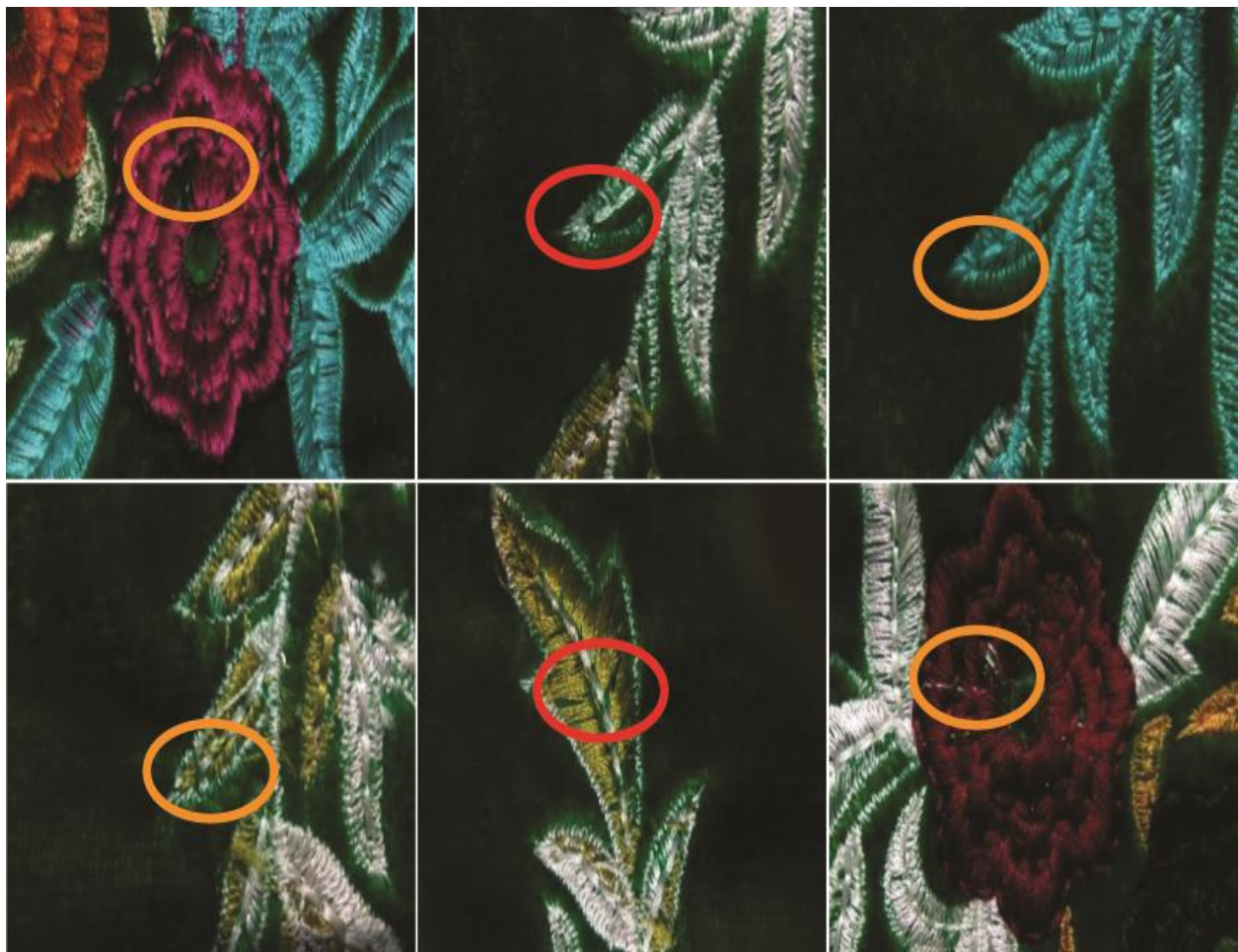


Figure 5: SA- Velvet

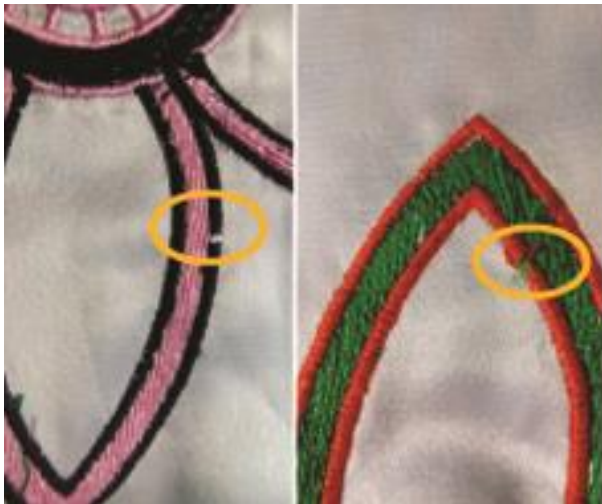


Figure 6: SA- Satin



Figure 7: SA- Organdie

After the initial sample analysis for the four set of fabrics in terms of the process variables, embroidered swatches were prepared in different

colorways for the adjudgement of clarity as well as compatibility index of fabrics and motif as shown in Figure 8.



Figure 8: Motifs and colorways for various sets of fabrics

3.4 End Product development

After conducting the respondent survey, process analysis and finalization of the motifs, it was evident that *Khadi* outclassed among the rest of the fabrics because of numerous reasons as it had exhibited minimum breakages of embroidery threads, no needle breaks, no fabric distortion,

only fabric without any skipped area and excellent clarity index. Due to all these reasons, *Khadi* was chosen for the development of end- product as cushion covers as shown in Figure 9. Cost break-up of the *Khadi* based cushion covers was also evaluated as shown in Table 2.

Table 2 Cost effectiveness of embroidered Khadi cushion cover

| Fabric type | Quantity | Raw material cost (fabric & embroidery threads) | Trims & notions cost | Process cost | Total cost |
|-------------|----------|---|-----------------------|------------------------------------|------------|
| Khadi | 01 | 230/- | 68/- (Laces, Zippers) | 200/- (Design, Embroidery process) | 498/- |

**Figure 9:** Cushion cover- Khadi fabric & corner floral motifs

4. Conclusion

The embroidery dynamics is mainly dependent on the type of base fabric used and also its suitability with the type of embroidery threads employed for the art-work. Along with, other quality parameters as needle breaks, fabric distortion and clarity index further depend upon the motif chosen and the operating speed of the process chosen.

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