CHAPTER - 4

DESIGN AND DEVELOPMENT OF JACQUARD FABRICS

4.0 INTRODUCTION

The results obtained in the present research work are discussed in this chapter. Dyed cotton yarns of Ne 30’s count were chosen for the research work and jacquard weave was selected for weaving pattern. The jacquard fabrics were woven and given different functional finishes and efficiency of each functional finish was tested by standard methods. Fifteen pieces of fabric of different size, colour and design were constructed. The Antibacterial finish has been imparted to these fabrics. Based on the efficiency of the finish, six fabrics were selected and imparted other functional finishes such as flame retardancy, water repellency, stain release and mosquito repellency finishes.

The selected best fabric samples from each of the three sets were imparted multifunctional finishes such as flame retardancy, water repellency, stain release and mosquito repellency. The finished fabrics were also characterized using FTIR and SEM. Tests were carried out to evaluate the performance of the jacquard fabrics with respective to comfort and physical properties. The developed jacquard fabrics were produced as bed sheets, pillow covers and curtains with functional finishes such as antibacterial finish, flame retardancy, water repellency, stain release and mosquito repellency finish. These fabrics are used in households as pillow covers, bed sheets and curtains.

The report of the market survey which includes availability of the jacquard fabrics, design, colour, size has been dealt in this chapter. Based on the above report, development of novel designs for new fabrics also has been dealt in this chapter.
4.1 CONSOLIDATION OF MARKET SURVEY

In order to find out the availability of the furnishing items made of jacquard designs in the market, a market survey was conducted by the investigator and the following aspects were discussed in detail.

All the data collected during the survey are given below in each category. Based on these data, the tool, design, fabric types were selected.

4.1.1 The Selected Export Units and Tool for Market Survey

Market survey was carried out in 50 leading jacquard fabric manufacturers at Karur, Chennimalai and Bhavani. The export units were selected randomly according to the movement of furnishing items in the market. The survey was conducted to gather information about the availability of furnishing fabrics made of jacquard design, colour, size and types available in the market.

Interview schedule was selected as the survey tool. An interview schedule with names of different furnishing items was prepared. The furnishing item mentioned in interview schedule includes bed sheets, mats, pillow covers, floor mats, curtains, cushion covers, tea towels, decorative mats and shirting materials. A questionnaire was prepared and the manufacturer or exporters were approached personally and the response was consolidated. Table 4.1 represents the availability of furnishing fabrics in the market.
Table 4.1 Availability of Jacquard Furnishing Fabrics in the Market

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Type of furnishing fabric</th>
<th>Number of respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Curtains</td>
<td>42</td>
<td>84</td>
</tr>
<tr>
<td>2</td>
<td>Decorative mat</td>
<td>17</td>
<td>34</td>
</tr>
<tr>
<td>3</td>
<td>Bed sheets</td>
<td>43</td>
<td>86</td>
</tr>
<tr>
<td>4</td>
<td>Mats</td>
<td>24</td>
<td>48</td>
</tr>
<tr>
<td>5</td>
<td>Pillow cover</td>
<td>41</td>
<td>82</td>
</tr>
<tr>
<td>6</td>
<td>Tea towel</td>
<td>13</td>
<td>26</td>
</tr>
<tr>
<td>7</td>
<td>Bedspreads</td>
<td>32</td>
<td>64</td>
</tr>
<tr>
<td>8</td>
<td>Towels</td>
<td>38</td>
<td>76</td>
</tr>
<tr>
<td>9</td>
<td>Bedcovers</td>
<td>28</td>
<td>56</td>
</tr>
</tbody>
</table>

From table 4.1, it is clear that maximum number of units sells curtains, bed sheets and pillow cover made of jacquard weave. The sales of jacquard designed furnishing fabrics like bedspreads, towels, bed covers and tea towels are less in the market. Maximum of 43 units out of 50 sold bed sheets made of jacquard weave and other jacquard items such as tea towel were sold minimally in only one fourth of the selected export units.

The products such as curtains, bed sheets, pillow cover, bedspreads, towels and bed covers made of jacquard weave were sold frequently in the market as their preference is high among the customers. The selling percentage of bedspreads, towels and bed covers were more (64, 76, 56 percent). It is clear from the market survey that 42 units sold curtains, 41 units sold pillow cover, 38 units sold towels, 28 units sold bedcovers, 32 units sold bedspreads, 24 units sold mats, 17 units sold decorative mat and 13 units sold tea towel made of jacquard weave out of the total 50 export units.
4.1.2 Selection of Design and Shades of Colour

Information regarding the existing designs of the jacquard fabric in the markets was also gathered in survey. Since, jacquard weave is one of the traditional techniques for preparing fabric, the basic design for weaving is well known. The designs included in interview schedule were lines and stripes, checked, floral or animal, border and geometric forms. The fabrics were constructed in different designs with various colour shades such as dark, light and both dark and light. Table 4.2 gives details about the existing design and colour shades used in jacquard fabrics.

Table 4.2 Existing Designs and Colour Shades of Jacquard Fabrics in the Market

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Designs</th>
<th>Response rates in percentage</th>
<th>Colour Shades</th>
<th>Response rates in percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lines and Stripes</td>
<td>26</td>
<td>Dark</td>
<td>44</td>
</tr>
<tr>
<td>2</td>
<td>Checked</td>
<td>22</td>
<td>Light</td>
<td>54</td>
</tr>
<tr>
<td>3</td>
<td>Floral/ Animal</td>
<td>84</td>
<td>Both Dark and Light</td>
<td>70</td>
</tr>
<tr>
<td>4</td>
<td>Border</td>
<td>14</td>
<td>Both Dark and Light</td>
<td>48</td>
</tr>
<tr>
<td>5</td>
<td>Geometric</td>
<td>12</td>
<td>Dark</td>
<td>46</td>
</tr>
</tbody>
</table>

From the table 4.2, it is clear that maximum of 84 percent of export units are selling jacquard woven fabrics prepared with floral and animal motives. The jacquard fabrics made with geometric motives are sold in minimum. Fabrics with Lines and stripes design were sold in 26 percent of units. Jacquard woven fabrics with checked design were sold in 22 percent of units, where as jacquard woven fabrics with border and geometric designs were sold in 14 and 12 percent respectively.

In case of shades of colours, combination of both dark and light colours was sold in maximum of 70 percent in the market than dark and light colour. Dark colour shades were sold in 46 percent of units and shades of light colour were sold in 54 percent of units. The jacquard woven fabrics with floral or animal design with both dark and light shades were sold in maximum number of export units. The jacquard woven fabrics
constructed with geometric design and dark colours were sold in minimum number of units.

4.2 EXISTING YARN COUNT AND SIZE OF THE JACQUARD FURNISHING ITEM

Based on the market survey, it is evident that dyed cotton yarn with Ne 30’s count was selected for jacquard fabric construction. According to the survey report, the fabrics such as bed sheets, pillow cover and curtains made of jacquard weave were sold in higher number in the market. The counts of yarns used for weaving this type of jacquard fabrics were also consolidated from market survey. The existing yarn count in the market survey is given in table 4.3.

Table 4.3 Existing Yarn Count used for Jacquard Fabrics in the Market

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Count of the yarn, (warp/weft)</th>
<th>Type of fabric (percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Bed sheets</td>
</tr>
<tr>
<td>1</td>
<td>2/17 X 2/17’s</td>
<td>14</td>
</tr>
<tr>
<td>2</td>
<td>2/20 X 2/20’s</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>2/30 X 2/30’s</td>
<td>78</td>
</tr>
</tbody>
</table>

From the table 4.3, it is clear that maximum units sold fabric prepared from 2/30 X 2/30’s (warp/weft) count. Bed sheets and curtains of 2/30 X 2/30’s (warp/weft) count were sold in 78 percent of units. About 74 percent of export units sold pillow cover of 2/30 X 2/30’s (warp/weft) count. Bed sheets and curtain of 2/20 X 2/20’s (warp/weft) count were sold only in 10 percent of export units. About 10 percent of export units sold pillow cover of yarn count 2/17 X 2/17’s and 14 percent of export units sold bed sheets and curtain of yarn count 2/17 X 2/17’s. The existing size of the leading furnishing items in the market are given in table 4.4.
Table 4.4 Existing Size of Jacquard Furnishing Items in the Market

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Bed sheets</th>
<th>Pillow cover</th>
<th>Curtains</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Size of the furnishing items in centimeter</td>
<td>Size of the furnishing items in centimeter</td>
<td>Size of the furnishing items in centimeter</td>
</tr>
<tr>
<td>1.</td>
<td>150 X 225</td>
<td>45 X 70</td>
<td>120 X 200</td>
</tr>
<tr>
<td>2.</td>
<td>175 X 225</td>
<td>40 X 65</td>
<td>120 X 225</td>
</tr>
<tr>
<td>3.</td>
<td>225 X 25</td>
<td>42.5 X 80</td>
<td>150 X 200</td>
</tr>
</tbody>
</table>

From the table 4.4, it is clear that bed sheets of size 150 X 225 centimeters were sold in maximum of 78 percent and bed sheets of size 225 X 250 centimeters were sold in only 8 percent of export units. In pillow covers, size of 45 X 70 centimeter was sold in maximum of 74 percent of export units. Pillow covers of 40 X 65 and 42.5 X 80 centimeter in size was sold only in 14 percent of export units. Curtain of 120 X 200 centimeter were sold in maximum of 64 percent of export units. Curtains of 120 X 225 centimeter in size were sold in minimum of 16 percent of export units.

4.3 DESIGN AND DEVELOPMENT OF JACQUARD FABRICS

From the consolidated results of market survey, jacquard weave was selected for the present study. Dyed cotton yarn of Ne 30’s count was chosen for study based on the survey results of yarn count. The selected design for the study was floral and animal motives with both dark and light shades. Three sets of fabrics were constructed based on the above results.

4.3.1 Selected Design and Colour Shades

Elaborate designs are woven on intricately constructed loom called Jacquard Loom. The maximum figuring capacity of a loom is limited by the capacity of jacquard, and the number of warp thread in which they can independently operate and control. The size of the motif is dependent upon the counts used.
Fifteen pieces of fabric of different size, colour and design were constructed based on the survey report. Table 4.5 shows the design and colour used for fabric construction. The jacquard products were designed according to the following design and colour shades.

### Table 4.5 Designs and Colour Shades Used for Fabric Construction

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Type of furnishing fabric</th>
<th>Designs (percentage)</th>
<th>Colour shades (percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lines/stripes</td>
<td>Checked</td>
</tr>
<tr>
<td>1.</td>
<td>First set</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>2.</td>
<td>Second set</td>
<td>28</td>
<td>6</td>
</tr>
<tr>
<td>3.</td>
<td>Third set</td>
<td>22</td>
<td>6</td>
</tr>
</tbody>
</table>

From the table 4.5, it is clear that 84 percent of first set of jacquard fabrics were constructed with floral / animal design. Fabric with border design was not chosen for construction as they have minimum sale in the market. About 50 percent of first set of jacquard fabrics were given shades of both dark and light shades. In second set of jacquard fabrics, 52 percent of fabrics were constructed with floral/animal design and about 54 percent of jacquard fabrics were given dark colour shades. In third set of jacquard fabrics, 66 percent of fabrics were constructed with floral/animal design. About 60 percent of third set fabrics were given shades of both dark and light shades.

### 4.4 VISUAL INSPECTION

The visual inspection was carried out to get the opinion about the newly developed jacquard fabrics. All the 15 novel designed jacquard fabrics were shown to a total of 50 jacquard fabric manufacturers to get the opinion about the design development, colours chosen and general appearance of the novel designed jacquard fabrics (Appendix-III). The result was tabulated as follows.
Table 4.6 Visual Inspection Ratings by the Jacquard Fabric Manufacturers

<table>
<thead>
<tr>
<th>S. No</th>
<th>Samples</th>
<th>Selection of motif/ design</th>
<th>Selection of colour</th>
<th>General appearance</th>
<th>Sample grading in % out of 50 experts</th>
<th>Rating (Set wise)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>VG</td>
<td>G</td>
<td>F</td>
<td>P</td>
<td>VG</td>
</tr>
<tr>
<td>1.</td>
<td>A1</td>
<td>84</td>
<td>12</td>
<td>04</td>
<td>-</td>
<td>78</td>
</tr>
<tr>
<td>2.</td>
<td>A2</td>
<td>80</td>
<td>16</td>
<td>16</td>
<td>-</td>
<td>82</td>
</tr>
<tr>
<td>3.</td>
<td>A3</td>
<td>78</td>
<td>18</td>
<td>18</td>
<td>-</td>
<td>74</td>
</tr>
<tr>
<td>4.</td>
<td>A4</td>
<td>76</td>
<td>14</td>
<td>10</td>
<td>-</td>
<td>76</td>
</tr>
<tr>
<td>5.</td>
<td>A5</td>
<td>92</td>
<td>04</td>
<td>04</td>
<td>-</td>
<td>84</td>
</tr>
<tr>
<td>6.</td>
<td>B1</td>
<td>86</td>
<td>12</td>
<td>02</td>
<td>-</td>
<td>82</td>
</tr>
<tr>
<td>7.</td>
<td>B2</td>
<td>82</td>
<td>12</td>
<td>06</td>
<td>-</td>
<td>84</td>
</tr>
<tr>
<td>8.</td>
<td>B3</td>
<td>76</td>
<td>18</td>
<td>06</td>
<td>-</td>
<td>70</td>
</tr>
<tr>
<td>9.</td>
<td>B4</td>
<td>78</td>
<td>10</td>
<td>12</td>
<td>-</td>
<td>82</td>
</tr>
<tr>
<td>10.</td>
<td>B5</td>
<td>74</td>
<td>16</td>
<td>10</td>
<td>-</td>
<td>80</td>
</tr>
<tr>
<td>11.</td>
<td>C1</td>
<td>84</td>
<td>08</td>
<td>08</td>
<td>-</td>
<td>88</td>
</tr>
<tr>
<td>12.</td>
<td>C2</td>
<td>72</td>
<td>12</td>
<td>16</td>
<td>-</td>
<td>76</td>
</tr>
<tr>
<td>13.</td>
<td>C3</td>
<td>78</td>
<td>08</td>
<td>14</td>
<td>-</td>
<td>86</td>
</tr>
<tr>
<td>14.</td>
<td>C4</td>
<td>70</td>
<td>18</td>
<td>12</td>
<td>-</td>
<td>88</td>
</tr>
<tr>
<td>15.</td>
<td>C5</td>
<td>86</td>
<td>12</td>
<td>02</td>
<td>-</td>
<td>68</td>
</tr>
</tbody>
</table>
4.4.1 Selection of Design/Motif

Regarding selection of design /motif, all the samples were rated as very good by more than 70 percent of the evaluators. Out of all the novel designed fabrics, sample A5 was rated as very good by 92 percent of the evaluators.

4.4.2 Selection of Colour

Out of the entire novel designed jacquard fabrics, samples C1 and C4 have rated as very good by 88 percent of the evaluators. Very minimal number of evaluators rated (less than 14 percent) as fair.

4.4.3 General Appearance

It is evident that all the samples were rated as very good by more than 72 percent of the evaluators and sample A5 rated by maximum of 94 percent of the evaluators.

4.4.4 Sample Grading

All the evaluators were asked a general opinion about the novel designed jacquard fabrics. Maximum of 94 percent of the evaluators said sample A2 is in the category of very good due to its attractive design and colour combination.

4.4.5 Overall Rating

The rating was done by set wise by the 50 jacquard fabric manufacturers. In first set, sample A2 was rated as first and B2 and B5 was rated as first in second set and sample C4 was rated as first in third set.
4.5 CONCLUSION

Based on the market survey results, the jacquard fabrics have been designed and developed with floral/animal motives and both dark and light colours. In total, 90 meters of jacquard fabrics with 15 different designs of three sets have been woven for this work. The prepared yarn samples were taken for weaving and changes were made in the tie up of the treadles. These fabrics were given antibacterial finish and based on the antibacterial efficiency, six fabrics were selected and given other functional finishes such as flame retardancy, water repellency, stain release and mosquito repellency finishes to develop the multifunctional finished jacquard fabrics.