CHAPTER – 12

SUMMARY AND CONCLUSION

12.0 SUMMARY

Textile industry continuously searches for new technologies in order to satisfy the consumers gracing demands. In recent years, new developments allowed the production of functional and smart textiles, which are capable of sensing changes in environmental conditions and responding to these change. Textile designers in general and jacquard fabric designers in particular have to develop their creative abilities to add new and special aspects to the product regarding form and function in which they have to use all the available recent technological methods in the designing operation to develop a creative product. There is more advancement in modern times, with the development of new fabrics, new weaving and finishing techniques. Newer designs were introduced to cater to the changing fashion. Finishing process is carried out to improve the natural properties or to add attractiveness to the fabric.

In this modern world, more importance is given to the interior decoration of the houses. By using different coloured fabrics, houses are decorated with different types of home textile products with personal touch. Everyone has their own taste in decorating their home to give a different look. Through this research work an attempt has been made to develop new jacquard designs and a novel finish to the jacquard designed fabrics to develop home textiles such as bed sheets, pillow covers and curtains.

The present study was to design and develop jacquard fabrics with multifunctional property. A market survey was conducted in order to find the availability of the furnishing items made of jacquard designs and details about jacquard fabrics such as colour, size and type of jacquard fabrics which includes bed sheets, mats, pillow covers, floor mats, curtains, cushion covers, tea towels, decorative mats and shirting’s in the market. Market survey was carried out from 50 jacquard fabric manufacturers at Karur, Chennimalai and Bhavani. The units were selected randomly based on the movement of furnishing items in the market.
Interview schedule was selected as the survey tool. A questionnaire was prepared and the manufacturer or exporters were approached personally and the response was consolidated. Jacquard fabrics were selected based on the findings of the market survey. The designs selected for the study included floral and animal motives with multi coloured effect. Maximum of 44 export units out of 50 sold curtain made of jacquard weave and other jacquard items such as tea towel were sold minimally in only one fourth of the selected export units. It was clear from the market survey that 42 export units sold bed sheets, 41 export units sold pillow cover, 38 export units sold towels, 28 export units sold bedcover, 32 export units sold bed spreads, 24 export units sold mats, 17 export units sold decorative mat and 13 export units sold tea towel made of jacquard weave out of the total 50 export units.

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. It was clear that maximum of 84 percent of export units were selling jacquard woven fabrics prepared with floral and animal motives. The jacquard fabrics made with geometric motives were sold minimally. In case of shades of colours, combination of both dark and light colours was sold in maximum of 70 percent export units in the market than dark and light colour. Information regarding the existing designs of the jacquard fabric in the markets was also gathered in the survey. The jacquard woven fabrics with floral or animal design and 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 export units.

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 fabric were constructed based on the results.
The jacquard is a Shedding device placed on the top of the loom to produce large figured patterns by using a very large number of warp threads separately, by means of harness, cords, hooks and needles but without any heald-shaft. Fifteen novel designs were designed using computer aided software and the same were produced in three different sets. In each set, about six meters of jacquard designed fabrics were produced.

Elaborate designs were woven on intricately constructed looms called jacquard loom, allowing each warp yarn to be controlled by use of perforated cards. The whole designs were drawn using Adobe Photoshop tools which is the basic element for creating a design. A total of 90 meters of jacquard fabrics were woven, six meters each in five designs from each set of jacquard fabrics were selected for the weave and changes were made in the tie up of the treadles.

The jacquard samples were finished with the antibacterial agent “‘Quarternary Ammonium Salts (Methacryloxyethyl benzyl dimethyl ammonium chloride-DMAE-BC).’” The finished fabrics were then tested for the antibacterial activity by using standard test methods. Based on antibacterial activity results of 15 fabrics, only higher efficient fabrics (6 samples) were selected for further study. The functional finishes such as flame retardant finish, water repellent finish, stain release finish and mosquito repellent finish were given and the efficiency of each finish on the fabric was tested according to the standard test methods.

The coatings of each finish on the fabric were studied for identifying the types of chemical bonds (functional groups) and surface topography. The characteristics of the finished fabrics were tested and the results were compared to the control (unfinished) fabric by Fourier Transform Infrared Spectroscopic analysis (FTIR) and Scanning Electron Microscopic analysis (SEM).

The multifunctional property was imparted to the fabric in the following method. A series of bath was prepared such as the first bath containing antibacterial agent – “Quarternary Ammonium Salts (Methacryloxyethyl benzyl dimethyl ammonium
chloride-DMAE-BC)”, the second bath containing flame retardant finishing agent “Tris (2-Chlorethyl Phosphate)”, third bath containing water repellent finishing agent “Elastomeric (Polydimethyl Siloxanes) compound” in combination with “Acetoxy Silanes” in the ratio of 100:5, fourth bath containing stain release finishing agent “Perfluoro Octane Sulfonic Acid”, and the fifth bath containing aqueous extracts of Lemongrass Oil respectively. The fabrics were dipped in to the first bath, air dried and then to second bath, air-dried separately. The processes were continued till all the finishes were given to the fabric and the efficiency of each finish was tested according to the standard test methods.

The coatings of each finish on the single fabric after multifunctional finish was studied for identifying the types of chemical bonds (functional groups) and surface topography. The characteristics of the finished fabric are tested and the results were compared to the control (unfinished) fabric by Fourier Transform Infrared Spectroscopic analysis (FTIR) and Scanning Electron Microscopic analysis (SEM). The health care products such as bed sheets, pillow covers, and curtains have been developed using multifunctional finished jacquard fabrics.

12.1 CONCLUSION

Based on the market survey results, the jacquard fabrics have been designed and developed in adobe Photoshop software with floral/animal motives and both dark and light colours. In total, 90 meters of jacquard fabrics with 15 different designs of three sets each consisting of five designs has been woven for this work. These fabrics were given antibacterial finish and based on the antibacterial efficiency, six fabrics were selected and given other functional finishes such as flame retardency, water repellency, stain release and insect repellency finishes developing the multifunctional finished jacquard fabrics.

From the test results of the antibacterial finished fabrics, the best six fabric samples, two representing each set are selected and used for multifunctional finishing and testing and then, the characteristics have been studied. Out of best six samples, Sandy
flow fabric (B1) has got maximum absorbency of antibacterial finish, because of its fabric structure (surface thickness). After imparting all the physical tests, Sandy flow fabric (B1) has showed better result than the remaining samples.

Flame retardant finish has been imparted to all these fabrics. Out of the six samples, Peacock gold fabric (C2) has maximum flame retardant finish efficiency. The physical properties of the flame retardant finished fabrics such as fabric weight, abrasion resistance, tensile strength and colour fastness are analyzed. Based on the physical test results, Peacock gold fabric (C2) shows better results when compared to other fabrics. The characterization of the best efficient finished Peacock gold fabric (C2) was analyzed by FTIR and SEM test and it shows the uniform deposition of finished chemicals on the surface of the yarn.

Out of the best six samples, after imparting water repellent finish, it is found that Sandy flow fabric (B1) has got maximum level of absorbency of water repellent finish on the surface of the fabric due to its smooth structure and light weight when compared to the other samples.

The physical properties of the stain release finished fabrics such as fabric weight, abrasion resistance; tensile strength and colour fastness are studied. Out of the best six samples, Sandy flow fabric (B1) has got good result with stain release finish and physical tests due to its maximum absorbency of stain release finish when compared to the other samples. Hence the characterization of the best efficient finished fabric Sandy flow fabric (B1) is analyzed by FTIR and SEM. This analysis proves that sample Sandy flow fabric (B1) has uniform deposition of the finished chemicals presented on the surface of yarn.

The physical properties of the mosquito repellent finished fabric such as fabric weight, abrasion resistance, tensile strength and colour fastness are studied. Based on the physical tests, sample Peacock gold fabric (C2) shows better result when compared to the other samples. Hence the characterization of the best efficient finished fabric Peacock gold fabric (C2) was analyzed by FTIR and SEM analysis and it shows the presence of finishing chemicals on the surface of the fabric.
After imparting multifunctional finishes to the jacquard samples the best efficient peacock gold fabric sample (C2) was analysed for the durability of antibacterial activity after different wash cycles. Wash durability test proves that jacquard fabrics treated with multifunctional finishes withstood for up to 20 wash cycles.

Out of six samples, after imparting multifunctional finish such as flame retardant finish, water repellent finish, stain release finish and mosquito repellent finish, sample Peacock gold fabric (C2) has good result because of its smooth surface and its softness when compared to other samples. Hence the characterization of the best efficient multifunctional finished Peacock gold fabric (C2) was analyzed by FTIR and SEM and it proved that there was a uniform presence of multifunctional finishing chemicals on the surface of the fabric.

The six different attractive designs with suitable colour combinations have been used to develop six novel jacquard fabrics. These six fabrics have been used to develop home textiles such as bed sheets; pillow covers and curtains each consisting of two sample fabrics. The constructed pillow cover, bed sheet and curtain have been shown and discussed with 50 leading manufacturers of jacquard woven cotton furnishing fabrics to get their opinion /feedback about the design created, colours chosen, size and regarding the home textile products. It is observed that, they have given very good feedback about the novel products having multifunctional finishes. Hence, it may be concluded that all the designed and developed multifunctional finished jacquard fabrics observed the imparted multifunctional finishes and showed better result with all the samples. Out of six fabric samples, Peacock gold fabric (C2) has showed the best result when compared to all the other samples.

As a summary, the consumers show interest in buying better, durable and less wash needed fabrics. This experimental study will pave way for improving the quality of value added home textile products with multiple functions.
12.2 FUTURE RECOMMENDATIONS

The present research work has opened up many new approaches for further studies and some are listed below.

- Different yarns like Jute, Linen and Sisal with different counts may be used for the development of novel designed jacquard fabrics.
- Extend the use of multifunctional finishes to various other home textile products.
- Selection of finishes can be varied to determine the different end products.
- Developing multifunctional knitted fabrics using other suitable finishes.
- Exploring the use of design development, fabrics with fancy weaves can be created for garment construction.