

CHAPTER V

CONCLUSIONS AND SUGGESTIONS

This research investigated the textile print qualities printed by screen printing and inkjet printing. The same pigment dispersion and two binders (BR-700 and S-711) of the same acrylic family were used as ink resins. Two inks contained a pigment-to-binder (P/B) ratio of 1:2. Fume silica was added to the screen ink for increasing its viscosity. The inkjet ink was printed on the pretreated cotton fabric by the solution poly(ethylene oxide). The screen ink was printed on the nontreated cotton fabric. These printed cotton fabrics were analyzed in terms of color, optical density, tone reproduction, stiffness, air permeability and crockfastness.

5.1 Conclusions

5.1.1 Inkjet Ink and Screen Ink

The viscosity and flow behavior are the main different factors of inkjet and screen inks, because they are the prime driving parameter for the inkjet ink to pass through the nozzles or for the screen ink to push through the open meshes of the screen onto the cotton fabric. The ink properties are acceptable for inkjet properties: pH (8-9), viscosity (4.6-6.3 mPa s), surface tension (40-41 mN m⁻¹), pigment particle size (98-200 nm) and S-711 binder particle size (111 nm), which give the best ink

ejection and printability. Moreover, the stability of pigmented inkjet inks is one of the effective parameters on viscosity. Chemical stability in inkjet ink is that no agglomeration or no increase in particle size takes place. It was found that particle size and viscosity of inkjet inks increased very little during two-month storage in room temperature at around 25-30 °C. They give the acceptable property: viscosity (5.05-8.58 mPa s), surface tension (40-43 mN m⁻¹) and ink particle size (122-205 nm).

In case of screen inks, fume silica was added during the preparation of screen ink to increase the ink viscosity, and to meet the non-Newtonian behavior for screen ink (viscosity, 4.2-5.3 Pa s). The screen ink flows fairly smooth to give continuous printed image on the nontreated cotton fabric.

5.1.2 Printing and Print Quality

The number of pass printing and the pretreatment reagent (PEO) control the color of inkjet printing. The three-pass printing on the pretreated fabric yield the high color gamut, color gamut volume and color saturation. However, color saturation and color gamut could not be better more than these of screen ink, because the inkjet ink penetrated into the fabric, so the amount of pigment holdout on the fabric surface is lower than that of the screen ink.

The pretreatment reagent, poly(ethylene oxide) did not affect the stiffness value (low value) and air permeability (high value of air permeability) because it deposited on the fabric surface and the inter-fiber space to produce the smooth surface. The stiffness also depends on the amount of ink on the printed fabric.

The stiffness of printed cotton fabric with inkjet ink and screen ink did show a significant difference, because a different amount of ink was deposited on the fabric surface.

The characteristics and the amount of ink deposited on the fabric controlled the air permeability and crockfastness. The thick ink layer covered the fabric surface gives low air permeability and crockfastness. The printed cotton fabric of screen ink yielded the lower air permeability and crockfastness than that of the inkjet ink. Nevertheless, tone reproduction of the printed cotton fabric printed either by inkjet ink or screen ink was nearly the same, but ink density on the print at 80-90% original by screen inks was higher than that of inkjet inks.

Regardless of the number of printing pass and pretreatment, we can conclude that both inkjet ink and screen ink gave the same properties of color, tone reproduction and stiffness. The inkjet ink gave the better air permeability and crockfastness due to the surface pretreatment of cotton.

5.2 Suggestions

To make this work more complete, one may need to study the effects of ink penetration and its ink film thickness on inkjet ink printing. Chemical interaction of the ink binder with the pretreatment reagent and the chemical behavior of cotton may give some insight information for ink design in inkjet ink.

Pretreatment reagents are another controlling property both for ink design and selection of fabric for inkjet printing. This topic is highly recommended for further investigations.



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