

CHAPTER I

INTRODUCTION

1.1 Scientific Rationale

Traditionally, textile inks are most often applied by a screen printing process. Screen printing offers many benefits but there are also several important drawbacks to this type of textile printing, one of the biggest drawbacks is machine efficiency (downtime). Because of this inefficiency, short-run prints run is not economical. In addition to the machine efficiency, screen printing also involves a lengthy and expensive sampling process. The design is converted into screen files, which are engraved. Once screens are ready, colors are matched and patterns are “struck-off” on the print machine.¹

To overcome of these disadvantages, textile printing by inkjet printing has been proposed. The biggest benefit inkjet printing provides is the reduction of downtime. Inkjet printers do not require a lengthy setup time between patterns. In addition to increased efficiency, inkjet printing also provides the elimination of screen cost in sampling and short-run production. Printing without screen eliminates the registration problem and most importantly provides mass customization. However inkjet technology addresses most of the challenges posed by predicted trends in textile production for the new millennium. The move towards short-run lengths continues

and rapid response by printers to customer demands, coupled with “right first time” and “right on time” delivery, remain the key to future business.¹

Considerations about the ink and the way the ink interacts with the textile indicated that inkjet inks must be of very low viscosity and water-like consistency. Penetration of inkjet ink is higher than screen printing ink, so it should have pretreatment in order to increase surface area for the drops to rapidly permeate into the fabric. Screen printing inks are paste-like material with short and buttery appearance, which permits low penetration and lies thick deposits as a film on materials. In addition, the smaller size of pigment particles, a minimal amount of pigment, and binder are used to allow inkjet ink to give a good-hand stiffness property, to provide the printhead reliability required, to give transparent process color. The print quality in a printing system depends on the interactions of ink and substrate, which are composed of three major attributes: wetting, penetration, and spreading. These three factors determine the digital image durability and appearance.

In this research, we investigated print qualities of cotton fabric using screen and inkjet inks. Elucidation and comparison of print quality in terms of color, optical density, tone reproduction, stiffness, air permeability, and crockfastness were studied.

1.2 Objectives of the Research Work

The objectives of this research are to elucidate the print quality of screen printing and inkjet printing on cotton fabric.

1.3 Scopes of the Research Work

This research focuses on formulation and quality of screen and inkjet inks. The same pigment dispersion and two types of binder (BR-700 and S-711) in the acrylic family were used. Two inks were formulated, which contain a pigment-to-binder (P/B) ratio of 1:2. The cotton fabric was pretreated with poly(ethylene oxide) solution for inkjet printing. After printing, elucidation and comparison of screen and inkjet ink print qualities in terms of color, optical density, tone reproduction, stiffness, air permeability, and crockfastness were studied.

1.4 Contents of the Research Work

This thesis consists of 5 chapters as follows: Chapter 1 gives general introduction. Chapter 2 displays the principles of screen and inkjet printing processes, compositions and properties of ink, and cotton fiber. A brief literature review of related previous work is carried out. In chapter 3, the details about the materials, apparatus and procedure for this research are explained. Chapter 4 describes the results discussion, elucidation, and comparison of print qualities of the two printing inks in terms of color, optical density, tone reproduction, stiffness, air permeability, and crockfastness on the printed cotton fabric. Finally, the summary and suggestion for the future work are in chapter 5.