

# CHAPTER 1

## INTRODUCTION

### 1.1 Scientific Rationale

Inkjet printer offers quiet operation, high speed, and compatibility with various substrates. The inkjet technology is one of the most fitting for use in the production of color fidelity and fine detail. Inkjet technology is the best current candidate for use as a hard copy device. The inkjet printing system is becoming popular in the market. There are two varieties of ink in the conventional inkjet ink system. One is water-soluble dye-based ink and the other is pigmented ink. For the highest image quality applications, dye-based inks have been preferred, but for signage applications where durability, especially lightfastness, is required, pigmented inks have become a very popular option. There is no longer a need to choose between dyes and pigments. This valuable proposition is made possible by a breakthrough in pigmented ink technology. Pigment-binder systems are the most rapidly growing area of the textile printing. These coloration systems have significant advantages since only a simple thermal cure is required after printing, and good stability properties can be achieved without steaming or post washing. The most important requirement of pigmented inks is that the stable pigment is dispersed over a wide range of temperatures and times.

This research investigates the effects of pigment/binder ratios and pigment dispersions on the ink properties and the fabric printing. The pigment particles were dispersed by the different dispersion technologies as follows: polyester polymer dispersion, surfactant dispersion, micro-encapsulation, and surface modification. Four types of fabrics namely cotton, silk, polyester, and cotton/polyester (35/65) are used as printing substrate. The printed fabrics are evaluated for color value, air permeability, bending length, and wet/dry crockfastness.

## 1.2 Objectives of the research work

The objectives of this research are as follows:

1.2.1 To explain effects of pigment/binder ratios produced by various dispersion techniques on the ink property and the cotton printing.

1.2.2 To explain effects of ink dispersion on the various fabrics by pigmented inkjet inks.

## 1.3 Scope of the research work

This research involves measurement and characterization of pigment/binder ratio in the pigmented inkjet inks made from various dispersion techniques, including printing qualities of these inks on the cotton fabrics. Based on these four different pigment

dispersion technologies, polymer dispersion, surfactant dispersion, micro-encapsulation, and surface modification. Furthermore, the effect of pigment dispersion on the various fabrics pre-treated with various pre-treatment levels was also studied in this research. The cationic pigment, cationic polymer and aqueous polymer were used for pre-treatment reagent on the various fabrics namely cotton, silk, polyester and cotton/polyester (35/65). The pH, viscosity, surface tension and particle size of the inks were measured for ink formulation quality. The printed fabrics are evaluated for color value, air permeability, bending length and wet/dry crockfastness.

#### 1.4 Content of the research work

This thesis consists of 5 chapters including introduction, theoretical background and literature review, experimental, results and discussion, and conclusions and suggestion. Chapter 2 displays a brief of inkjet history, the overview of inkjet printing, the dispersion technologies in pigmented inkjet inks, a brief of textile printing, textile fiber and their properties, the printed fabrics properties and the brief literature review of some previous reports. In Chapter 3, the details about the materials, apparatus and procedure of this research are explained. Chapter 4 presents the results and discussion of the dependency of ink properties on the pigment/binder ratio, the pigment dispersion techniques. Moreover, the pre-treatment on the various fabrics, and the printed fabrics are also explained.