EFFECT OF DWELL TIME DURING HEAT SETTING TREATMENT ON THE PROPERTIES OF DYED AND UNDYED KNITTED POLYESTER FABRICS

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TABLE OF CONTENTS

Page

TABLE OF CONTENTS

Page

ABSTRACT

Heat setting is a thermal treatment that involves heat, pressure and time to improve fabric dimensional stability and mechanical properties. However, some physical properties also may affected by the heat setting treatment. Thus, a study was conducted to find the effect of dwell time on the properties of dyed and undyed knitted polyester fabric. Knitted polyester fabric has lower stability than woven fabrics usually undergoes heat setting treatment to improve its dimensional stability. Meanwhile, dyed fabric also tends to fade its colour after heat setting treatment. Heat setting was done onto dyed and undyed knitted polyester fabrics bought at Spotlight Store Sdn Bhd at constant temperature of 160˚C at different dwell time of 3 minutes, 5 minutes and 7 minutes. Analysis on the mechanical properties, physical properties, colour fastness and whiteness index on both fabrics were done to observe if there was any effect caused by different dwell time. The results show that there were no significant results of different dwell time during heat setting treatment that may affect knitted fabrics' mechanical and physical properties. Fabrics that were bought at stores are likely to have already undergo treatment before they are sold to the consumers. Future researches can perform better analysis on the performance of the heat setting treatment by doing it on the untreated fabric sample.

Keywords : heat setting treatment, dyed fabric, undyed fabric, mechanical properties, physical properties, whiteness index, colour fastness, knitted polyester fabric

CHAPTER ONE

INTRODUCTION

1.1   Background Study

Heat setting is a process done onto fabrics and textiles to increase its quality and performances. It is a thermal process which involves heat and takes place commonly in steam atmosphere or dry heat environment. Idumah et al., (2014) stated that the heat setting process is determined by the temperature, time of heat setting, the medium of heat setting (air, solvents and water) and the tension applied to the substrates during heat setting. Since heat is used in this process, heat-setting is an expensive and energy elaborative textile process. Heat setting is necessary to guarantee size accuracy and dimensional stability for textile materials (Besler, Gloy & Gries, 2016). Depending on the material different heat setting methods such as saturated steam or hot air are used for the fixation.

During heat-setting, shape retention, crease resistance, resilience and elasticity are imparted to the fibres. It also brings changes in strength, stretch ability, softness, dyeability and sometimes on the colour of the material. The change of the characteristics, aesthetics and performances of the textiles could be due to mechanical changes of the fibres which are treated by the hot air. The heat-setting treatment is reconstructing the fibres morphology as the saturated heat is ruining the fibres constructions. Kalebek and Babaarslan (2016) discussed on changes of the molecular structure of both amorphous and crystalline phase due to the heat-setting. All these changes are connected with the structural and chemical modifications occurring in the fibres. Most studies concluded that the increase in the crystalline fraction and the size of the crystalline domains during heat setting signing qualitative changed in the superstructure and morphology of the oriented matrix (Chen et al., 2011).