

Case Study of Wrinkle Resistance with a Durable Press Finish

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PUREPRESS™ technology, developed by Cotton Inc., is a durable press finish, using crosslinking resins, that keeps fabrics wrinkle-free and reduces loss of strength and abrasion resistance (Cotton Incorporated, n.d.). To improve wrinkle resistance, cotton fabrics are treated with crosslinking resins through a standard pad, dried, and cure fabric application process. This finish helps cotton fabrics look smooth, retain their shape, improve shrinkage, and reduces pilling. Additionally, PUREPRESS™ technology resists wrinkles and abrasion without using formaldehyde (Cotton Incorporated, n.d.). Durable Press is an important finishing technology for fabrics made from cellulose fibers, such as cotton. Durable press finish increases wrinkle recovery through various crosslinking treatments using formaldehyde-based, non-formaldehyde reagents (Tusief et al., 2014; Xu & Wang, 2012; Yang et al., 2010). Wrinkle resistant finishes are commonly used on cotton, and the demand for cotton fabric continues to increase. Investigation of the newly commercialized durable press finish for wrinkle resistance on cotton fabrics could provide empirical information to consumers and industry professionals.

Historically, urea formaldehyde (UF) and an acid-forming ammonium salt accelerator were used on cellulosic fibers as wrinkle resistant finishes, establishing early work primarily on cotton and rayon fibers. This ultimately resulted in the lowest wrinkle recovery compared to melamine formaldehyde and ethylene urea formaldehyde (Cooke et al., 1957). By studying the chemical build of each of these thermosetting resins, this allows textile researchers and chemists to choose a particular system or reagents best designed for the specific fabric properties desired for wrinkle resistance (Cooke et al., 1957; Yang et al., 2010). From their experiment of testing several cross-linkage based treatments, results indicate formaldehyde resins have a weak resistance against wrinkles in cotton fabrics (Frick et al., 1960). Although a durable press finish using non-formaldehyde reagents like PUREPRESS™ technology has been developed, few studies have investigated its wrinkle resistance in comparison with cotton and cotton-branded fabrics. Thus, this study is needed to evaluate wrinkle resistance with PUREPRESS™ technology that uses non-formaldehyde crosslinking resins through a standard pad, dried, and cure fabric application process. The purpose of this study was to examine wrinkle resistance of PUREPRESS™ technology, in comparison to 100% cotton and cotton blended fabrics with and without wrinkle resistance finish.

Wrinkle resistance of PUREPRESS™ technology was examined compared to cotton fabrics, cotton/polyester blended fabrics, and a cotton blended fabric with wrinkle resistant finishes. The specific fiber content is as follows: a 100% cotton with PUREPRESS™ technology in twill weave, a 100% cotton in plain weave; a 65% polyester, 35% cotton in plain weave; a 55% cotton, 45% polyester in plain weave with a wrinkle resistant finish available by the market.

Page 1 of 3

All fabric samples were appropriate to be made as a dress shirt. AATCC 128 Wrinkle Recovery of Fabrics: Appearance Method was conducted to evaluate the wrinkle resistance of the chosen fabric samples.

Results indicate that 100% cotton fabric with PUREPRESS™ technology showed greater wrinkle resistance than the other cotton and cotton blended fabrics with and without wrinkle resistance finish. The 100% cotton fabric with PUREPRESS™ technology showed an average of 3.75 in wrinkle resistance, indicating good wrinkle resistance and performing better than all the other fabric samples. The 100% cotton with PUREPRESS™ technology showed a highest wrinkle resistance compared to the 55% cotton, 45% polyester with a wrinkle resistant finish and the other fabric samples. The 100% cotton with PUREPRESS™ technology showed significant improvements in wrinkle resistance, compared to 100% cotton, as 100% cotton had an average of 2 in wrinkle resistance. These results verify excellent wrinkle resistance performance with PUREPRESS™ technology. When comparing results from the cotton and cotton blended fabrics, there may be possible effects of polyester and wrinkle resistance finishes on wrinkle resistance. The 100% cotton resulted in an average of 2, indicating subpar wrinkle resistance. However, the 55% cotton, 45% polyester with wrinkle resistance finish had an average of 2.75 in wrinkle resistance. The 65% polyester and 35% cotton with no wrinkle resistance finish had an average of 1.25, implying the wrinkle resistance finish, rather than a blend with polyester, could have a better effect on improvements of wrinkle resistance. Interestingly, the 100% cotton held stronger wrinkle resistance than the 65% polyester and 35% cotton blended fabric with no wrinkle resistant finish; this may result from different physical and mechanical characteristics such as higher twists in the 100% cotton fabric than the 65% polyester and 35% cotton blended fabric.

These findings indicate the 100% cotton fabric with PUREPRESS™ technology performed better than the other cotton and cotton blended fabrics with and without wrinkle resistance finish. According to the results, the fabrics designed with PUREPRESS™ technology and wrinkle resistance finish produce fewer wrinkles. PUREPRESS™ technology is formaldehyde free, creating a better alternative to other cotton fabrics with wrinkle-resistant finishes. This study provides an understanding of formaldehyde-free PUREPRESS™ technology and easy-care performance with wrinkle resistance. Suggestions for future research include more in-depth research to explore factors that influence wrinkle resistance. In this study, the cotton blended fabric with polyester performed worse than the 100% cotton fabric. Other factors that influence wrinkle resistance could be type of fiber, blend with spandex, twist, type of weave, fabric density, and type of wrinkle resistance finishes. Investigating physical and mechanical factors of fabric on wrinkle resistance is need for future research. Besides, durable press treatment affects the properties of a fabric mainly due to the crosslinking of cellulose molecules and chemicals applied in the treatment process (Tusief et al., 2014; Xu & Wang, 2012). Durable press treatment improves dimensional stability, pilling resistance, strength, and abrasion resistance, while reducing elasticity and flexibility (Frick et al., 1960; Xu & Wang, 2012). More extensive research of PUREPRESS™ technology, which improves tensile strength, tearing strength, and abrasion resistance, is suggested, compared to a conventional durable press finish as well.

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