

**SURFACE CHANGES OF COTTON FABRICS MEASURED  
BY ALLASSO INDUSTRIES' SURFACE ANALYSERS**  
**Judy B. Holden, Norma M. Keyes, and Kathleen B. Van Winkle**  
**Cotton Incorporated**  
**Cary, NC**  
**Olin Stewart**  
**Allasso Industries**  
**Raleigh, NC**

**Abstract**

Consumers of cotton textile products are concerned with changes that can occur during use and care, specifically, color loss, shrinkage, and appearance. Changes in these attributes can progress to such levels (degradation) that consumers determine the textile item to be unusable, or at least, creates a perception of dissatisfaction. Aspects of fiber processing, spinning, wet processing, and manufacturing can impact the performance of color fidelity, dimensional change, and appearance. Consumer research by Cotton Incorporated has found that consumers consider the attribute of appearance to include both smoothness and surfaces changes that are the consequences of wear and care. One surface change frequently observed on cotton apparel, and apparel of other fibers and blends of fibers, is pilling. Surface disruptions, called fuzzing, are believed to be a precursor to pill formation. Heretofore, the textile industry has used standard abrasion test methods to predict surface changes. Abrasion performance assessments for standard tests utilize photographic scales that display different, progressive levels of pilling. Subjective measurements, such as the pilling scale, have inherent problems: human influence, repeatability, and precision. Two additional problems exist with the photographic pilling scale. While pilling is predominantly a knitted fabric phenomenon, the photographic scale portrays pilling grades on woven fabric. Secondly, pilling formation in the photographs does not show a consistent difference between grade levels across the scale. New instruments, developed by Allasso Industries, Cary, NC, for quantification of surface texture and pills, were investigated as a potential, objective measurement of surface changes. One hundred percent cotton knitted fabric samples from an internal fabric development project were given to Allasso Industries for analysis of texture and pilling. The samples had been tested by a widely used apparel abrasion method: ASTM D3512 Pilling Resistance and Other Related Surface Changes of Textile Fabrics: Random Tumble Pilling Test. The same test specimens with subjective pill ratings were compared to the pilling index measurements from Allasso's Pilling and Fuzz Analyser. Additional fabric samples from an internal knitted garment wear trial of 100% cotton and 60%cotton/40% polyester interlock and pique golf-style shirts that had subjective pilling grades at multiple laundering intervals were also analyzed with the Allasso system. Image analysis was also performed on all of the fabric samples using Allasso's Surface Texture Analyser. A review of the data shows subjective pill ratings and objective image-based pilling index values to be comparable.