

Title: Effect of cotton-polyester composite yarn on the physico-mechanical and comfort properties of woven fabric

Author Names: Nasrin Akter, Md. Reazuddin Repon, Arnob Dhar Pranta, Shaima Islam, Azmat Ali Khan, Abdul Malik

Abstract: Cotton is the most widely used natural cellulosic polymer and polyester is a synthetic polymer. The use of polyester fiber is increasing gradually day by day due to its strength and longevity, while the use of cotton fiber is decreasing due to its unavailability. At present, the use of cotton-polyester composites is ubiquitous. This research work aims to assess the physical, mechanical and comfort properties of the woven fabric using cotton-polyester composite yarns in a weft direction and coarser yarn count because of the use of these fabrics in the future for the denim manufacturing process. Four different samples were fabricated by using 100% cotton (10 Ne) yarn in the warp direction and 100% cotton, cotton-polyester composite, and 100% polyester yarn in the weft direction of the fabric. Similar fabric and machine parameters were maintained for manufacturing all the samples. The samples were then tested for areal density, tensile strength, thickness, abrasion resistance and pilling, drape, flexural rigidity, and air permeability to find the optimum capability of the fabric. Physico-mechanical properties with the proportion of increasing polyester components in fabrics improves areal density (184 to 199 g/m²), strength (almost 19 times in weft direction), drape (0.655% to 0.789%), and flexural rigidity (almost double). On the other hand, increasing comfortability properties with the proportion of cotton components in fabrics improve air permeability (139.85 to 159.58 cc/s/cm²), abrasion (only 3.036% mass loss), and pilling resistance (grading 4 after 2000 cycles)

Keywords: Cotton-polyester composite; Woven fabric; Denim manufacturing; Physical properties; Mechanical properties; Comfort properties;

<https://doi.org/10.1002/pls2.10141>

<https://4spublications.onlinelibrary.wiley.com/doi/full/10.1002/pls2.10141>