IMPACT OF TUCK LOOPS FOR COLOR DEPTH OF 100% COTTON SINGLE JERSEY FABRIC VARIATIONS

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DECLARATION

I declare that this is my own work and this thesis/dissertation does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other University or Institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text. I retain the right to use this content in whole or part in future works (such as articles or books).

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The above candidate has carried out research for the PhD/MPhil/Masters thesis/dissertation under my supervision. I confirm that the declaration made above by the student is true and correct.

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ABSTRACT

Influence of dye absorbency against structural variations of 100% cotton knitted fabrics

In this research work the influence of dye absorbency against structural variations of 100% cotton knitted fabrics were investigated as these materials are widely used for T-shirt manufacturing. Since the achieving of required color depth in these materials is critical, the dyeing behavior against structural variations was investigated.

For this experiment, eight different knitted fabric samples were produced with different tuck loop densities using same machine settings and same yarn. Next these samples were pretreated and dyed under same conditions for all three primary colors red, blue and yellow for both light and dark shades. Then these samples were tested for L, a, b color values and DE color change using spectrophotometer. For the DE color change, the single jersey sample (with 0% tuck loops) was used as the standard.

The findings revealed that fabric structural variations significantly influence dye absorbency and perceived color, as measured by L, a, b, and ΔE values. Up to a tuck loop density of 33%, increased compactness enhance light scattering than reflection while dye absorption remain same, resulting in deeper shades (lower L values), more saturated hues (higher a and b values), and greater overall color difference (ΔE). Beyond this point, further compactness reduced dye penetration due to limited pore spaces and increased surface reflection, leading to lighter color appearance. These trends were consistent across all three reactive dye shades studied. The study concludes that an optimal fabric compactness exists approximately 33% tuck loop density for achieving maximum color strength and visual depth.

Keywords: Single jersey variations, Color values, dye absorbency, color reflection.

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LIST OF ABBREVIATIONS

Abbreviation	Description
CIE	Commission Internationale de l'éclairage
NA(OH)	Sodium Hydroxide
GSM	Grams per Square Meter
WPI	Wales per Inch
CPI	Courses per Inch