

## Mixing Yarns in Compact Twisting Process to Upgrade Functional Performance and Aesthetic Appearance of Outerwear Fabrics

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### **Abstract:**

**Statement of the Problem:** 1- The outerwear fabrics needs to upgrade both technical and aesthetic design by introducing new methods reflect on functional performance and aesthetic appearance away stereotypical methods with a same texture and appearance. Which needs to present a new vision contributes to activate technical and aesthetic dimensions of outerwear fabrics by mixing yarns in compact twisting process, which helps to promote it economically, and achieve ability to compete globally instead of producing from single blended yarns that reduces fabrics shelf life. 2- Using limited and repetitive typical applied methods for ply-twisted yarns within design without utilization of huge capabilities of compact twister m/c to twist yarns of different specifications to upgrade outerwear fabrics functionally, aesthetically, and fashionable for benefit of industrial establishment and consumer. 3- Scarcity of scientific and academic research dealt with mixing different yarns by compact twisting technique as a new way to upgrade outerwear fabrics functionally and aesthetically away typical methods in current production.

**Significance:** 1- Introducing a new technical method to achieve functional and aesthetic diversity in outerwear fabrics by enriching with many attractive surface, texture, and color appearances to reach aesthetic effects satisfy consumer. 2- Presenting a new vision for outerwear fabrics outperform their counterparts made of natural or artificial materials functionally and aesthetically, while maximizing added value of mixing different yarns by compact twisting technique to produce non-traditional fancy twisted yarns, thus enriching markets with advanced fabrics achieves global competition with similar products. 3- Developing innovative thinking and encouraging spirit of innovation among designers through designing new fancy twisted yarns and employing within design. Which add unique functional, aesthetic values for outerwear fabrics, and achieves highest economic return.

**Research Objectives:** 1- Producing a new and innovative types of non-traditional fancy twisted yarns fits for outerwear fabrics with multiple and varying levels of texture, appearance, and color that makes fabrics with unprecedented functional and aesthetic properties. 2- Determining the best specifications for outerwear fabrics through the best functionally and aesthetically unique yarn structure by studying relationship between properties of non-traditional fancy twisted yarns, and fabrics properties produced from. 3- Controlling of technical parameters of compact twister spindle effectively for non-traditional fancy twisted yarns to achieve functional and aesthetic requirements for outerwear fabrics.

#### **Research Hypothesis:**

The research hypothesizes that: Mixing different yarns by compact twisting technique positively affects upgrading functional performance and enriches aesthetic appearance of outerwear fabrics due to new and innovative properties of produced yarns that enrich design and innovation aspect of outerwear fabrics.

#### **Research Delimitations:**

Produce (12) new non-traditional fancy twisted yarns (Z/S) with (12 T.P.I), then woven as weft yarns by flexible rapier weaving loom with plain weave 1/1 to upgrade functionality and aesthetic appearance of outerwear fabrics.

#### **Research Methodology:**

The research follows experimental and analytical method to reach innovation in applied aspect.

#### **Outerwear Fabric Testing:**

The laboratory tests were carried out for produced fabrics (12) samples in weft direction, with standard atmosphere of laboratory at (temperature  $20 \pm 2$ , relative humidity  $65\% \pm 2$ ) according to American Standard Specifications (ASTM): fabrics tensile strength of (kg/5cm), fabrics elongation (%), fabrics abrasion resistance after 1000 friction cycles (%), fabrics hardness (ml gm), fabrics weight (g/m<sup>2</sup>), fabrics wrinkle resistance (degree).

**Results:** 1- It is difficult to determine compact twister technical parameters of non-traditional fancy twisted yarns in a primary database due to different and diverse specifications of single yarns, each non-traditional fancy twisted yarns has technical parameters completely different from the other. 2- Mixing yarns in compact twisting process has a varying and different effect depend on the difference of single yarn specifications, which confirms that single yarn specifications have either a positive or negative impact on functional and aesthetic properties of non-traditional fancy twisted yarns and thus fabrics. 3- Mixing yarns in compact twisting process gives a new and innovative solutions that contain a new and unique aesthetic vision enriches outerwear fabrics functionally and aesthetically, while maximizing the added value of compact twisting process. 4- Mixing yarns in compact twisting process developed functional performance and aesthetic appearance of outerwear fabrics from a psychological and physiological side, as well as achieving unlimited diversity in production of new, innovative, and endless types of fabrics with multiple and different functional and aesthetic properties compared to traditional fabrics currently produced. 5- Mixing yarns in compact twisting process is one of distinguished methods played an effective role in giving outerwear fabrics a distinctive aesthetic appearance and texture, so it can be used on a large scale and in different textile fields and applications due to its unique functional and aesthetic properties. 6- Non-traditional fancy twisted yarns produced by compact twisting technique, with their various aesthetic effects, which depend mainly on

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irregularity in thickness or twists beside their functional purposes, are tools that inspire designer and help him to invent new ideas characterized by seriousness and satisfying desires of consumers, which helps to raise quality of textile products and increasing their competitiveness, whatever purpose of their use.

**Keywords :**

Mixing Yarns, Compact Twisting, Non-Traditional Yarns, Marl Yarns, Novelty Fancy Yarns, Outerwear Fabrics.

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