TECHNICAL BULLETIN

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TRI 1015

RANDOM SLUB RING YARN PRODUCTION ON CONVENTIONAL EQUIPMENT

Concept

To produce a 100% cotton novelty ring yarn with slubs of random size and length using conventional mill machinery without any special attachments. This new technology provides a method to create very short and small size slubs, which are not attainable with most electro-mechanical designs due to their inherent limitations. This random slub process can be a cost-effective, alternative method for producing novelty slub yarns.

Introduction

Cotton Incorporated developed a process for producing a random slub ring yarn by using small amounts (5%-20%) of comber noils (0.5 in/12.5mm or less) in the final drawing process (usually two "short cotton" slivers in the creel). The practical count range of yarn from this process is projected to be Ne 30/1 and coarser. The main targets for this type of yarn include denim, shirting, fashion fabrics for women's wear, and home products.

Fiber Processing Specifications for Producing Random Slub Ring Yarn

General Procedure

One or two slivers made from comber noil/short staple virgin cotton are introduced into the drawing creel at the finisher drawing step with six to seven ends of "base" cotton or virgin lint (base cotton slivers can be produced in the normal manner). These short fiber slivers produce drafting waves, which later become thick places or slubs in the yarn.

Cotton Fiber Selection

The requirements of the yarn count being produced and the end product are the dictating factors in determining the base cotton quality and properties that are best suited for the most economical situation. Also, the size and number of desired slubs may be influenced by the choice of cotton fiber length and quality.

Blending for Short Cotton Component

A sliver made up of mainly short fiber (blend of noil and short virgin cotton) must first be produced. Intimate blending of 50% comber noil (0.5 in/12.5 mm or less) and 50% short virgin cotton (1.0 in/25.4 mm or less) can be achieved by using weigh pans or by controlling the noil percentage in the actual laydown for producing this sliver. A higher or lower percentage of comber noil can be used depending on the desired random slub effect and carding performance. The comber noil properties should be controlled to avoid changes to the slub size and frequency.

Opening and Cleaning

Both base cotton (virgin lint) and noil/short cotton blend should be separately opened and cleaned through the standard mill machinery with the recommendation to bypass the coarse trash cleaner for the noil/short cotton blend (to prevent removing the noil).

Carding

The noil/short cotton blend should be carded into a predetermined card sliver weight to achieve the desired amount of noil (slub effect) in the yarn and resultant fabric. The selected base cotton can be represented by the standard cotton mill production.

Breaker Draw

The base carded cotton should be drawn into a predetermined sliver weight to achieve the desired amount of base cotton at finisher drawing and in the product. Card sliver made of the noil/short cotton blend should not be drawn before the finisher process of drawing, as it will change the desired slub size and frequency in the product.

Finisher Draw

At the finisher process of drawing, enough noil/short cotton blend card slivers should be blended with virgin cotton base slivers from the breaker drawing process to achieve the desired amount of noil (5%-20%) in the yarn. The noil/short cotton blend slivers can be creeled evenly between the base cotton slivers or segregated depending on desired slub effect. Figure 1 shows a random slub web board from the finisher drawing process where two noil/short cotton ends are side-by-side in the middle of the creel. A drawing web sample may be taken to see the effects that are being produced.

Roving

The blended finisher sliver is processed into the correct roving size to create the desired slub size and frequency in ring yarn. Select the best cradle apron spacer to achieve the desired slub size. It may be necessary to change the roving tension gear to build a full package due to the noil slub size and frequency in the roving. Also, it may be necessary to adjust the twist and start-up tension to achieve acceptable performance.

Ring Spinning

Setup Procedure:

1. Adjust twist as necessary to achieve the desired yarn strength and spinning efficiency. It is common to run 5-10% higher twist levels for all slub yarns.

2. Select the best cradle apron spacer to achieve and control the desired slub size.

3. Select the best traveler shape that allows the slubs to pass through without excessive yarn breaks.

4. Adjust spindle speed to achieve acceptable spinability.

Figures 2 and 3 show a random slub ring-spun yarn and a woven denim shirt fabric made from the same yarn in the filling.

Recommendations

Slub size and frequency can be altered by the following procedures:

- The amount of the noil in the card sliver fed to the finisher drawing process can be raised (larger slub) or lowered (smaller slub), depending on the desired effect.

- Sliver weights of the noil blend/short cotton and base cotton can be adjusted to create infinite character in the yarn.

- The draft distribution on the finisher drawing process can be weighted more on the front draft zone (larger slub) or weighted more on the back draft zone (smaller slub), depending on the desired effect.

- Roll settings or nip distances (ratch settings) of the finisher draw can be increased (larger slub) or decreased (smaller slub), depending on the desired effect.

- Finisher drawing speed can have a significant effect on slub size and frequency and will depend largely on the type and configuration of drawing frame used.

- High draft on roving and ring spinning will produce smaller and less frequent slubs. On the other hand, lower draft will produce larger and more frequent slubs.

- If yarn strength is an issue, the lower cost associated with the noil and short cotton allows the mill to maintain overall fiber cost by selecting a longer, stronger cotton for the base sliver.

Conclusion

The random slub procedure can provide a cost effective means for a spinning mill to enter the novelty yarn market. The process provides maximum flexibility with minimum (or no) capital investment.

Figure 1. Random Slub Finisher Draw Web

Figure 2. Yarn Board

Random Slub Effect
Filling Ne 20/1 KP, TM 4.6, 88/12 Cotton/Noil

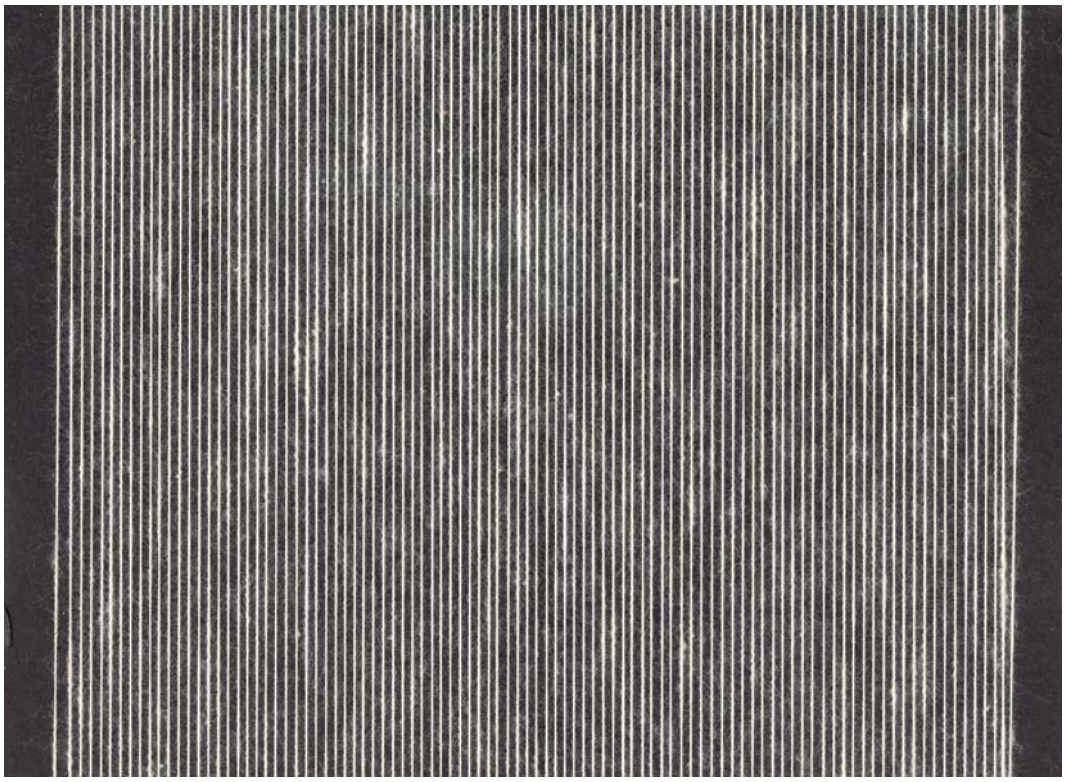
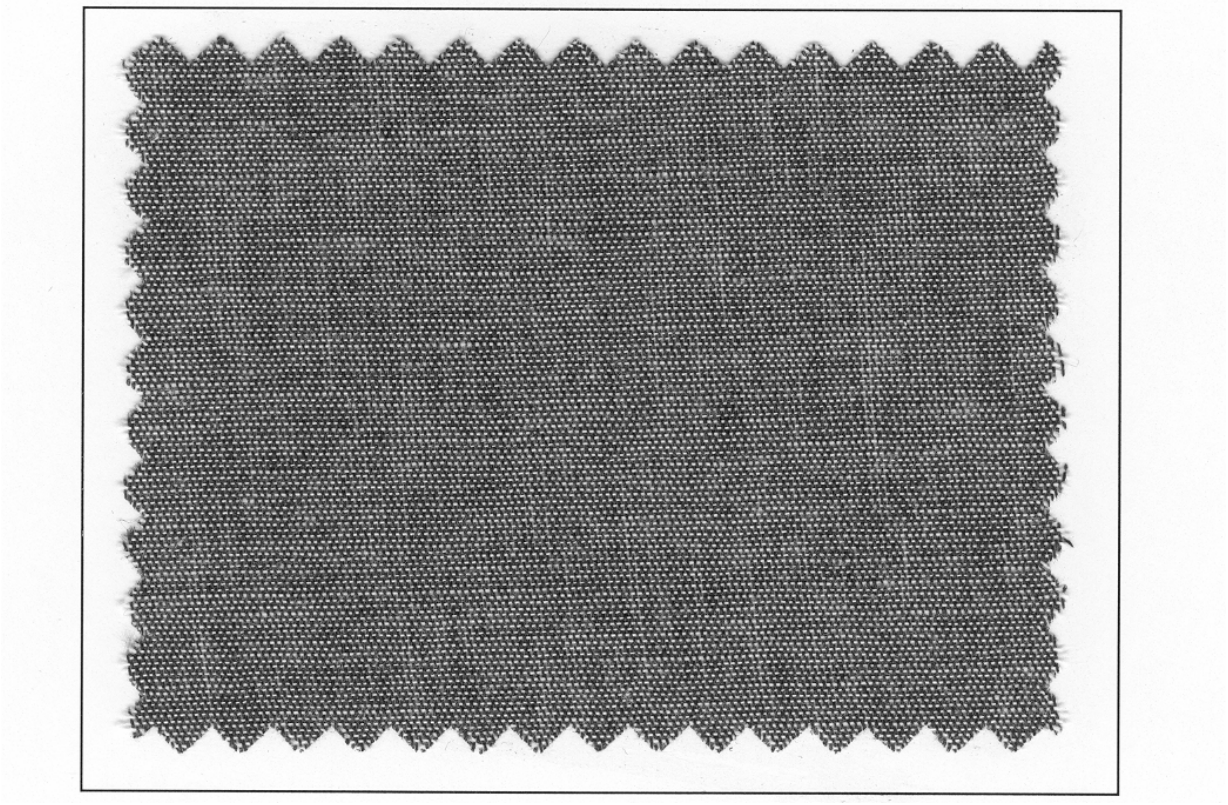


Figure 3. Woven Denim Shirt



RESEARCH AND TECHNICAL SERVICES

Cotton Incorporated is a research and promotion company representing cotton worldwide. Through research and technical services, our company has the capability to develop, evaluate, and then commercialize the latest technology to benefit cotton.

- Agricultural research leads to improved agronomic practices, pest control and fiber variants with properties required by the most modern textile processes and consumer preferences. Ginning development provides efficient and effective machines for preservation of fiber characteristics. Cottonseed value is enhanced with biotechnology research to improve nutritional qualities and expand the animal food market.

- Research in fiber quality leads to improved fiber testing methodology and seasonal fiber analyses to bring better value both to growers and then mill customers.

- Computerized fiber management techniques result from in-depth fiber processing research.

- Product Development and Implementation operates programs leading to the commercialization of new finishes and improved energy and water conserving dyeing and finishing systems. New cotton fabrics are engineered -- wovens, circular knits, warp knits, and nonwovens -- that meet today's standards for performance.

- Technology Implementation provides comprehensive and customized professional assistance to the cotton industry and its customers -- textile mills and manufacturers.

- A fiber to yarn pilot spinning center allows full exploration of alternative methods of producing yarn for various products from cotton with specific fiber profiles.

- The Company operates its own dyeing and finishing laboratory, knitting laboratory, and a laboratory for physical testing of yarn, fabric, and fiber properties including High Volume Instrument testing capable of measuring micronaire, staple length, strength, uniformity, color, and trash content.

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