

# Study on the Quality Characteristics of Slub Yarn Knitted Fabrics

Thanabal V, Gopalakrishnan M, Vijayasekar R

**Abstract:** Slub yarn is one types of fancy yarn that improve the aesthetic and comfort properties of fabrics made from them. Slub parameters include the slub thickness, slub length and the no of slubs per unit length of yarn. Slub yarns were produced with varying slub thickness and slub length. Single jersey fabrics were made from these slub yarn samples and the fabric properties like fabric weight per square meter, bursting strength, pilling, air permeability, moisture absorption and moisture evaporation. Fabric weight increases with increase in the slub thickness and slub length. Bursting strength increases with increase in the slub thickness and slub length whereas the air permeability decreases. Fabrics with thicker and longer slubs absorbs moisture easily and drain out the moisture at the faster rate.

**Keywords:** Slub yarns were produced with varying slub thickness and slub length.

## I. INTRODUCTION

Aesthetic is one of important aspects of textile products. Dyeing and printing are the some methods that improve the aesthetic nature of textile materials. Fancy yarns are one type material that improves the aesthetic appeal of garments made from these yarns. Slub yarn is one type of fancy yarns that improve both the aesthetic as well as comfort characteristics of apparels made from this yarn. Earlier slub yarns were made with mechanical devices attached in the drafting system of the ring spinning machine. Due to the mechanical design restrictions, there were limitations in the types of slub yarns produced. With start of the art machines, developments in the electronics and computer applications in the textile manufacturing machines, wide variety of slub yarns can be produced at present.

## II. CHARACTERISTICS OF SLUB YARN

The various parameters that determines the slub design in the yarn is given in the figure 1.

Slub yarn consists of thick places either periodically or randomly whose thicknesses and length change depending on the design. A slub is a courser yarn relative to the normal yarn. Slub portion of the yarn is made by decreasing the draft in the main or the front zone of the ring spinning drafting system. Computer controlled devices control the speed, the time of speed reduction and the rate of change of speed reduction of the bottom middle drafting roller depending on the data entered in the control system.

Manuscript received on 02 May 2021 | Revised Manuscript received on 08 May 2021 | Manuscript Accepted on 15 May 2021 | Manuscript published on 30 May 2021.

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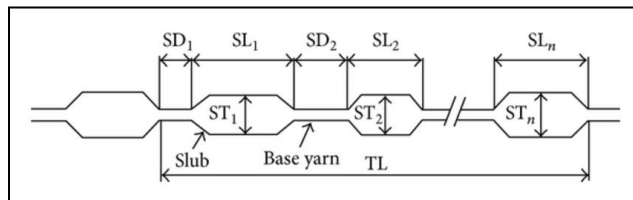


Figure 1. Slub Yarn Specifications

## III. MATERIALS AND METHODS

Yarn sample of 30s Ne was produced in the ring spinning frame. The quality characteristics of the cotton fibre used for the production of yarn samples are given in table 1.

Table 1. Quality Characteristics Cotton Fibre Used

Parameter	Unit of Measurement	Value
Fibre length		
2.5% Span length	mm	30
Uniformity ratio	mm	47
Fibre Strength	g/tex	22
Fibre Fineness	mic	3.6

The slub parameters of slub yarn samples produced during the study are given in table 3. The various quality characteristics of the yarn samples are given in table 2.

Table 2. Slub Parameters maintained

Sample Number	Slub Length	Thickness
1	-	100%
2	25.4 mm	150%
3	25.4 mm	175%
4	50.0 mm	150%
5	50.0 mm	175%

Single Jersey fabric samples were made from these yarn samples. The process parameters maintained in the knitting machine during the production of the knitted fabric samples are given in table 3.

Table 3. Knitting Parameters

Parameters	Value
Knitting Needle Type	Latch Needles
Machine Diameter	24''
Machine Gauge	24
No of Feeders	36

The fabric samples were tested for fabric weight per square meter, bursting strength pilling resistance, abrasion resistance, air permeability, water absorption and water evaporation.

#### IV. RESULTS AND DISCUSSIONS

##### Effect of Slub Parameters on Fabric weight.

The weight per square meter of the slub yarn fabrics increase with increase in slub thickness and slub length in the yarn. As the linear density of the slub yarn becomes coarser with increase in slub thickness and slub length. This trend is observed from figure 2.

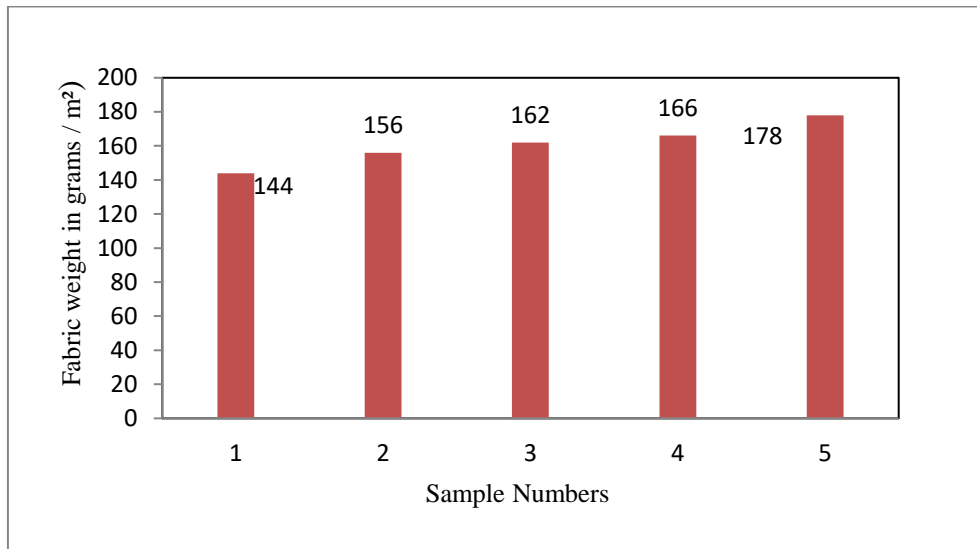


Figure 2. Effect of Slub Length and Thickness on the GSM of Fabric

Figure 1 shows the grams per square meter of the knitted fabric samples. The weight of slub yarn increases with increase in slub diameter, slub length and the number of slubs per 100 meters.

##### Effect of Slub Parameters on Fabric Bursting Strength

The bursting strength values of the fabric samples are given in figure 3. Bursting strength increases with increase in slub thickness and there is sudden reduction while the slub length is increased further. Reduction in the yarn elongation due to twist reduction in the slub yarn portion could be the reason the low bursting strength values.

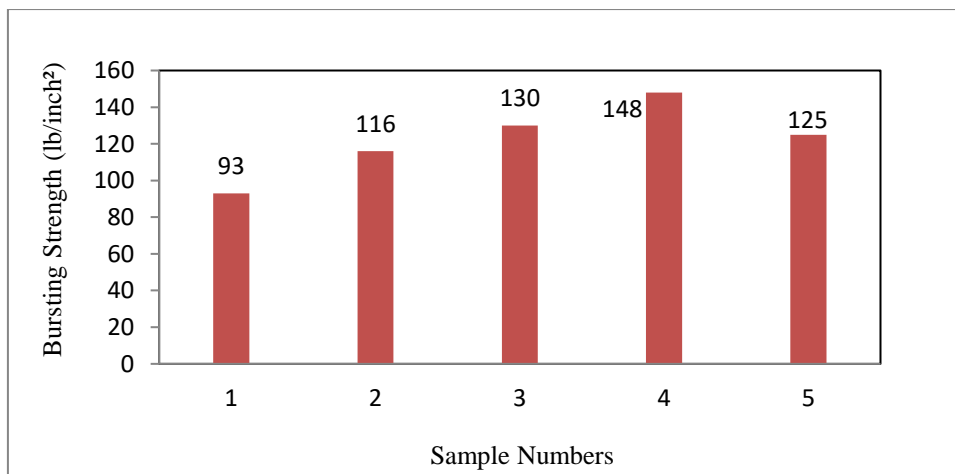


Figure 3. Bursting Strength Values of Slub Yarn Fabrics

##### Effect of Slub Parameters on Fabric Pilling

Pilling resistance is tested using a ICI pill box. The grading of the fabric after the pilling test were given in the table 4. It is observed that increase in the slub thickness and slub length increases pilling tendency due to more chances for the fibre to be removed from the yarn structure from the fabrics.

**Table 4. Pilling Behaviour of the Slub Knitted Fabrics**

Fabric Sample No	Piling Resistance Grade				
	Very Severe Piling	Severe Piling	Moderate Piling	Slight Piling	No Piling
1			✓		
2		✓			
3		✓			
4		✓			
5		✓			

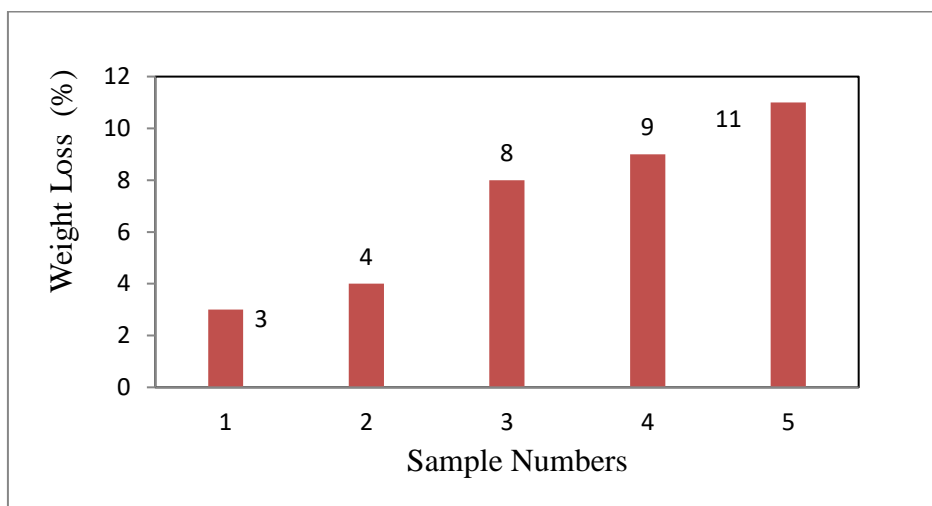
**Effect of Slub Parameters on Fabric Abrasion**

The weight loss % due to the abrasion was considered as a measure of fabric abrasion resistance. The weight loss % is calculated using the formula given in equation 1.

$$\text{Weight loss \%} = \frac{(\text{Weight of fabric before the test} - \text{Weight of fabric after the test})}{\text{Weight of fabric before the test}} \times 100 \text{ ----- (1)}$$

The weight loss due to the abrasion is shown in the figure 4. Fabric weight loss increase with increase in the slub thickness and slub length due to packing of fibres in the

slub portion of yarn. Since the yarn structure is more open with high slub thickness and slub length, the weight loss will be high for this yarn sample.



**Figure 4. Fabric weight loss due to abrasion**

**Effect of Slub Parameters on Fabric Air Permeability**

The effect of slub parameters on the air permeability of the single jersey knitted fabric samples are given in the figure 5. The air permeability increases with the increases in the slub thickness and slub length. This could be due the reduction the size of the pore in the fabric structure that restricts the free flow of air through it. There is no significant difference in the air permeability value of sample no 3 and sample no 4.



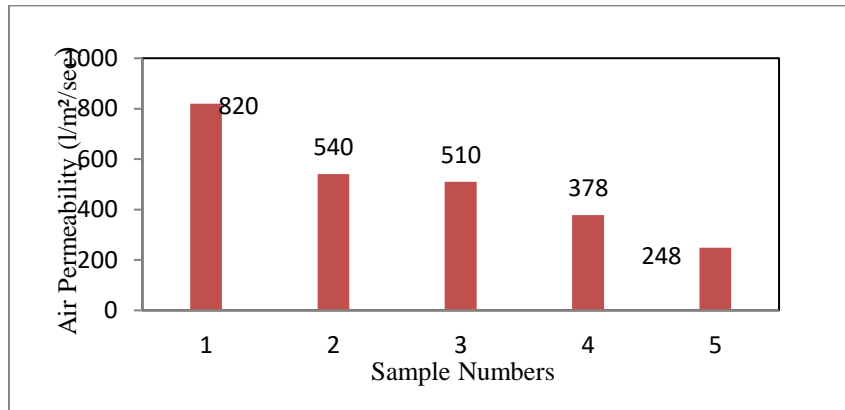


Figure 5. Fabric Air Permeability

**Effect of Slub Parameters on Fabric Moisture Absorption**

The fabric specimen of 1 cm length and 1 cm was left on the water surface in a tray and the time taken to immerse fully

inside the water surface is recorded using the stop watch. The details of observations are given in figure 6.

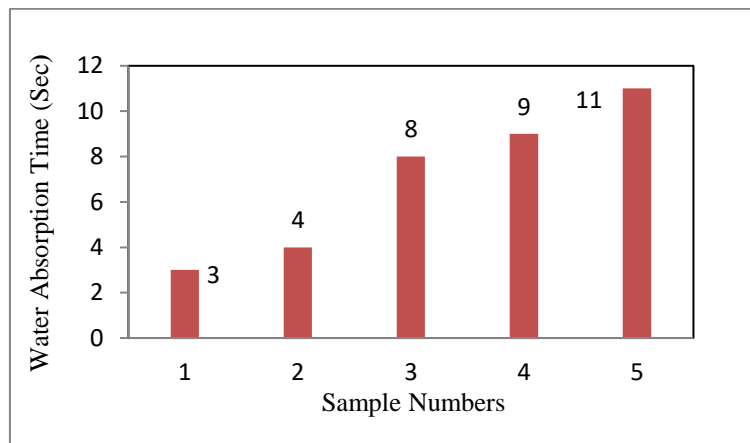


Figure 6. Fabric Water Absorption

**Effect of Slub Parameters on Fabric Moisture Evaporation**

The rate of moisture evaporation is observed using an electronic weighing balance. The weight of dry and wet samples were recorded. The time taken for the fabric samples to reach its dry weigh was determined and the results are shown in figure 7.

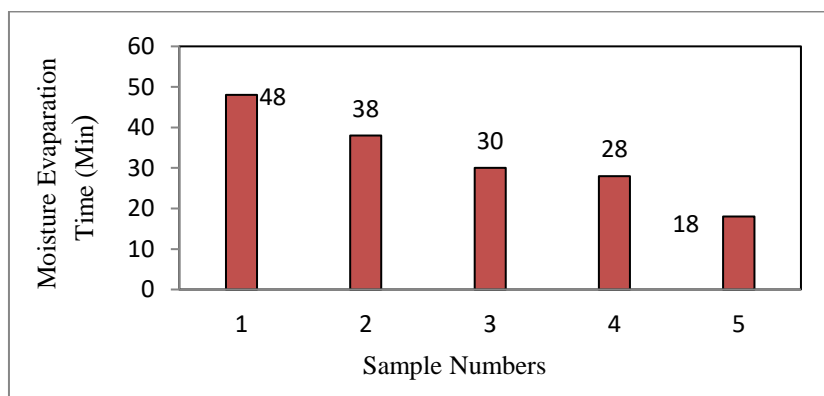
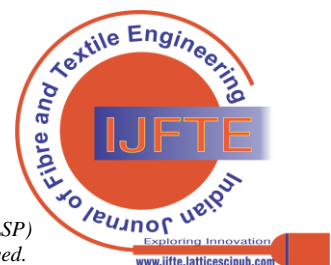


Figure 7. Fabric weight loss due to abrasion



## V. CONCLUSIONS

Fabric weight increases with increase in the slub thickness and slub length. Bursting strength increases with increase in the slub thickness and slub length whereas the air permeability decreases. Fabrics with thicker and longer slubs absorb moisture easily and drain out the moisture at the faster rate. Improvement in fabric quality parameters with higher thickness slub can be compensated with longer length slub yarns in the fabrics.

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