University of Management and Technology
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EFFECT OF RAW MATERIAL AND MACHINE SPECIFICATION ON THE SPINNING OF FINE COUNTS

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Study of Fine Counts

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STUDY OF FINE COUNTS

Executive summary

We studied the process and working conditions of fine count cd yarn. We divided the project into a number of sections; brief summary is given as follows:

The project was about fine yarn of spinning mill by the student of B.S Textile engineering. The objective of this project was to get practical knowledge of spinning mill. It helped us to know the all working of spinning mill that how all processes are completed and carried out

It was a great experience to see and examine the all processes. During the project we learnt a lot with the help and guidance of mill manager. All co-operative workers and helpers. They told us about every thing relating to our topic.

For the completion of this project we also experienced that how we work as a team and how a group can work properly with the help of each other and with the guidance of our teachers and others.

Acknowledgement

We always pray to **God almighty** for His blessing and guidance and our deepest gratitude are to Him for opening new horizons in our pursuit for knowledge. Undertaking project, which was not explored before and that too in textile setup which was relatively new, appeared a bit difficult initially. But with Allah's benevolence that apparently difficult task started becoming easy step by step and finally we have been able to formulate this study project**.**

The task would never have been accomplished that easily without teaching and direction of our learned professor **Dr. Sarwar Rana.** And finally our hearts felt gratitude to our respected teachers, our seniors & staff of our university for the encouragement and help they extended to us during the project.

By,

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Ch.1 Objective

1. To understand the parameter concerned raw material and machine setting for fine count spinning.

2. Problems arising during selection and process of raw material

3. Extra length necessary for fine count.

Chapter 2.Introduction of raw material

we make yarn from different material e.g wool , cotton , viscose rayon etc but we want make a fine yarn then some specification are necessary for example long sstaple length of fiber , precise machine setting , high strength , high elongation , low micronair value ,low coefficient variation , color retentation ,good absorbency ,easy to handle and sew. Fine yarn make on air jet , suljer machine

Fine counts are manufacturers, suppliers and exporters of different type of regular & specialized yarns for knitting and weaving. They offer 100% ring spun cotton yarn – The most widely-used natural fiber, highly-versatile cotton is known for its strength and comfort and is used in an amazingly wide variety of textile materials: For all of your knitting and weaving needs, our cotton ring spun combed yarn is available in a variety of counts. Our medium ring spun combed yarns are the preferred choice of circular knitters and hosiery manufacturers worldwide. Our fine ring spun combed yarns, produced with the world's finest cottons, and are used in higher-end sheeting and shirting fabrics. Counts range: 40/S to 80/S combed

2.1End uses of fine count

- Use in down stream industry eg; weaving , knitting , dyeing , garments**.**
- Good weavability.
- Fine knitting
- Effective dying
- Durability
- Luster
- comfortable

2.2Advantages of fine count.

- High export ratio.
- High qulity yarn.
- Handsome price.
- Market growth

2.3Disadvantages of fine count

- High investment cost
- Skilled labour
- Precise m/c setting

2.4Textile fiber

For a fiber to be suitable for textile purposes certain quality are desirable other are essential. First to be a textile fiber at all the length must be several hundred times the width. It is this that an enables fiber to twisted together to for a yarn or thread. In addition fiber must be strong and extremely flexible strength is needed to enable it to with stand the spinning and weaving process and proved the strength to the final cloth. Only flexibility permits the fiber to spin into shape of the yarn and woven into shape of cloth. The actual length of fiber is also important. It can be infinitely long but should not be short than 1/4 to 1/2 inches it will not hold together properly.

2.5Basic characteristics of fiber

A textile fiber is a peculiar object. It has not truly fixed length, width, thickness, shape and cross-section. Growth of natural fibers or production factors of manmade fibers are responsible for this situation. An individual fiber, if examined carefully, will be seen to vary in cross-sectional area along it length. This may be the result of variations in growth rate, caused by dietary, metabolic, nutrient-supply, seasonal, weather, or other factors influencing the rate of cell development in natural fibers. surface characteristics also play some part in increasing the variability of fiber shape. The scales of wool, the twisted arrangement of cotton, the nodes appearing at intervals along the cellulosic natural fibers etc.

2.6 Spinning count

Is a measure of fiber fineness and distribution developed by the English. It is defined as the number of hanks of yarn that can be spun from a pound of cotton. A hank of cotton is 840 yards (density of cotton fiber is1.58g/cm3).

2.7Cotton

Word cotton is derived from Arabic and is pronounced as kutan, qutn, qutun. Cotton is the seed hair of shrub which bears the botanical name of gossipium, a member of mallow family. Cotton fiber is obtained from the plant. Cotton is the most important fiber in the textile world. Almost nearly three quarter of the fabric is made from cotton & remaining one-quarter contributes the other fibers. Different varieties of the cotton are being used in textile industry. Most of them are Pakistani cotton, Australian cotton, American cotton, Afghani cotton & Egyptian cotton etc. Density of cotton fiber is 1.58 g/cm^3 which shows it is a heavy fiber. During the season 3 to 4 pickings are obtained .the 1st preferred as regard to maturity & uniformity of fibers. Before purchasing cotton samples are sent to the mill where they are tested and results are sent to the managing director who decides about the purchasing keeping the market in view. In order to make surety of availability of cotton, company purchases extra cotton that is stored in warehouse.

Cotton, as a natural cellulose fiber, has a lot of characteristics, such as

- comfortable soft hand
- Good absorbency
- Color retention
- Prints well
- Machine-washable
- Dry-cleanable
- Good strength
- Drapes well

Following are the basic parameters on which quality of cotton fiber depends.

- Fiber length
- Fineness
- Strength
- Maturity
- Rigidity
- Fiber friction
- Structural features
- Fiber elongation

Fiber length is one among the most important characteristics. It

- influences
- Spinning limit
- Yarn strength
- Handle of the product
- Luster of the product

- Yarn hairiness

The proportion of short fibers has extremely great influence on the following parameters

- Spinning limit
- Yarn strength
- Handle of the product
- Luster of the product
- Yarn hairiness
- Productivity

Uniformity ratio

Following ratings are adopted for uniformity ratio:

Uniformity ratio	**Rating**
Above. 80	Uniform
76-80	Average
71-75	Slightly irregular

Short fiber %age

Generally short fibers are those having length shorter than half of fiber staple Lengths i.e. less than 12.5mm.these are expressed as %age of average staple Length.
Higher % age of short fibers will result in:.

- Lower spinning limit.
- Lower yarn strength.
- Less yarn luster.
- Less yarn evenness.
- More yarn hairiness.
- Production losses due to higher end breakage & higher tpi.

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If 2.5% span length of the fiber increases, the yarn strength also increases due to the fact that there is a greater contribution by the fiber strength for the yarn strength in the case of longer fibers.

Staple classification	**Length mm**	**Length inches**	**Count**
Short	Less than 24	15/16-1	Below 20^{s}

Medium	24-28	1.1/32-1.3/32	20^s-34^s
Long	28-34	1.3/32-1.3/8	34^s - 60^s
Extra long	34-40	1.3/8-1.9/16	80^s-140^s ----------

2.8Fineness

Fineness determines how many fibers are present in the cross-section of a yarn of particular linear density. 80 to 100 fibers are needed minimum to produce a yarn
Fiber fineness influences

- Spinning limit
- Yarn strength
- Yarn evenness
- Yarn fullness
- Drape of the fabric
- Luster
- Handle
- Productivity

Productivity is influenced by the end breakage rate and twist per inch required in the yarn. For cotton micronaire is the estimation of fiber fineness. The fineness scale is given below:

Mic-value	**Fineness**
Upto3.1	Very fine
3.1-3.9	Fine
4.0-4.9	Medium
5.0-5.9	Slightly coarse
Above 6	Coarse

2.9Maturity

Immature fibers (unripe fibers) have neither adequate strength nor adequate Longitudinal stiffness. They therefore lead to the following,

- Loss of yarn strength
- Neppiness
- High proportion of short fibers
- Varying dye ability
- processing difficulties at the card and blow-room

Maturity ratio= (normal –dead)/200+0.70

Normal = %age.of.normal, fibers dead = %age.of.dead, fibers

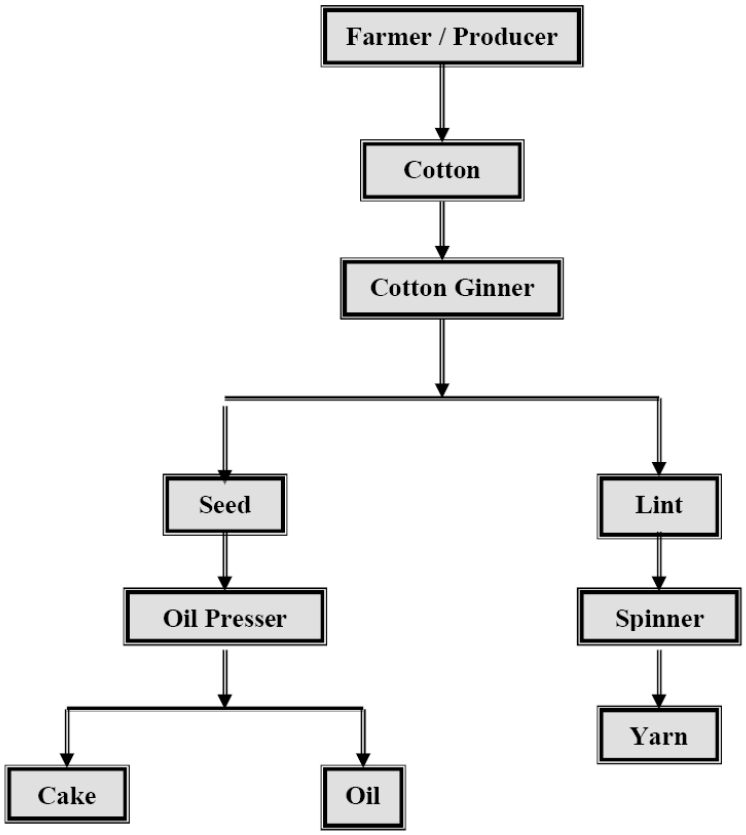
2.10 Fiber strength

The minimum strength for a textile fiber is
Approximately 6gms/tex.

G/tex	**Classification**
Below 23	Weak
24-25	Medium
26-28	Average
29-30	Strong
Above 31	Very strong

Influences Quality Evaluation	Characteristics Co-Relation to Yarn
1. Staple Length	Spinning Potential
2. Fiber Strength	Yarn strength, less Breakages
3. Fineness	Finer Spinning Potential
4. Maturity	Yarn Strength and even ness, better dyeing
5. Non-Lint. content (Trash)	Reduced Waste
6, Uniformity Ratio	Better productivity and Evenness
7. Elongation	Less end Breakages
8. Friction	Cohesiveness
9. Class	Yarn Appearance
10.Stickiness	Spinning problem by lapping & Dyeing quality
11. Grey Value	Yarn luster
12. Yellowness	Yarn Appearance
13.Neppiness	Yarn Neppiness
14. Moisture Content	8.5% moisture content optimum for spinning at 65%

Cotton Ginning Production flow



2.11 SWOT Analysis

Strengths:

- Raw material available locally
- Infrastructure available
- Excess install capacity

Weaknesses:

- Four times less productivity by use of local made old technology
- Non conformity of standard
- Semi skilled labor
- No technical training institute for Ginning Industry
- No testing laboratory for staple and fiber testing
- Contaminated cotton
- High rate of contamination
- Lack of online market facility to access international buyers
- No warehouses and cotton lint storage facilities

Opportunities:

- Introduction of latest modern ginning technology being used in developed countries
- Export of cotton to other countries
- Possibilities to achieve premium for best quality that government had announced on the basis of grade
- Access to international markets through online market
- Ginning Training Institute

Threats:

- Shifting trend from cotton fiber to polyester fiber
- Government regulations i.e. lot of taxes on the industry
- Fluctuation in international market price
- Global Competition
- Pest diseases on cotton crop result in low production of cotton lint
- Import of cotton
- WTO

Current Cluster Scenario:

- It account for 11.7 % of value addition in agriculture
- Contributes 2.9% to GDP
- Covers 13% of cropped area
- Provides raw material to 1212 ginning factories and 450 Textile Mills

Ch.3 Literature review

1. Research work by technologist on the importance of raw materials quality i.e., length, strength and micronaire value regarding fine count.
2. literature spin regarding machine parameter and its effects on fine counts spinning

Literature review

3.1 Development of Fine-Count Cotton :

Mr. Ahmed M. Mustafa, Agricultural Research Corporation -ARC-, ARC- cotton, 7, Wad Medani, 126, Sudan

3.2 Introduction

With the changes that have and are occurring in marketing of cotton, it is essential that breeders improve both lint yield and fibre quality. Modernization of spinning and textile manufacturing technologies necessitates fibre property improvement, particularly fibre strength, for the new technology to function efficiently. Recently, textile processing has undergone tremendous changes. The trend has been towards automatic and high speed processing at all stages in spinning, weaving, knitting and wet finishing (Niles 1980). Stronger cotton fibre is important to industry because new, high-speed machinery used to produce cotton yarn requires stronger fibre to work most effectively. This new technology has been driven by global competition that has forced manufacturers to produce more cotton yarn and fabric at less cost (Patil and Singh 1994).

Sudan produces five types of cotton; namely, Extra-fine, Fine, HA-count, Medium and Course-count cotton represented,. All these types of cotton are now being grown in the Sudan, except the fine-cotton type represented by Shambat-B. This variety has been withdrawn from production because of ginning problems and low ginning-out-turn (Mursal 1994). Accordingly, the development of fine-count cotton varieties has been sought as the top priority in the breeding programme.

3.3 A Research on the Compact Spinning for Long Staple Yarns

3.4Abstract

Compact spinning produces a new yarn structure, as the edge fibres are incorporated into the yarn due to the elimination of the spinning triangle, so that the harmful effects of the spinning triangle on yarn characteristics are eliminated. The compact yarns possess less hairiness, better strength, better uniformity and lower values of thick & thin places and neps compared to the conventional ring-spun yarns. In this article, some quality parameters of long-staple compact yarns are compared to those of long-staple conventional ring yarns.

3.5 Conclusions

- Fine compact yarns have more advantages than fine conventional ring yarns.
- The most important advantage of the compact spinning technique is a reduction in yarn hairiness, which brings new opportunities for the production of different products in the future. The weaving and knitting branches can profit from the compact spinning system.
- Although the compact spinning technique brings advantages regarding quality and production, we must bear in mind that the investment cost of the compact spinning machines are higher than the conventional ring spinning machines, and the cost of compact yarn is higher than the conventional ones, also. Consequently, worsted compact yarns are preferred for high quality and expensive products, especially for woven fabrics in the market.
- Investigations into compact yarn's advantages in downstream processing (weaving, knitting, dyeing, etc.) should be still continued.

3.6 Future Spinning Technology: Compact Spinning

by Muhammad Mushtaq Ahmad.

The advantageous compact yarns can be economically utilized in a variety of ways. All these possibilities are opening wide field for the creation and development of future products and applications, singing can be completely or partially dispensed
with. It cane can be said about sizing, which can be saved. If the strength of the conventional yarn is sufficient for the intended applications, using the compact technology will allow a reduction of