

BASIC TEXTILE OPERATIONS

NTQF Level -1

Learning Guide -35

Unit of Competence: Perform Pre-Spinning operations

Module Title: Performing Pre-Spinning operations

LG Code: IND BTO1 M10 LO1-LG-35

TTLM Code: IND BTO1 TTLM 0919v1

LO 1: Set up machine



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|--------------------------|----------------------------|
| Instruction Sheet | Learning Guide # 35 |
|--------------------------|----------------------------|

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Introduction to fiber
- Adjusting machine settings according to Product requirements
- Checking Specifications to identify requirements for production
- Loading raw material
- Reporting non-conforming materials
- Keeping machine area clean

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to:**

- ❖ Check fiber characteristics
- ❖ Check Specifications to identify requirements for production
- ❖ Adjust Machine settings to meet product requirements
- ❖ Load Product for processing according to manufacturer and work specifications
- ❖ Report Non-conforming materials
- ❖ Keep Area around machine clean during setting and loading



Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 27.
3. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the “Self-check 1”.
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
6. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions.
7. Read the information written in the “Information Sheet 2”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
8. Accomplish the “Self-check 2”.
9. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 2).
10. If you earned a satisfactory evaluation proceed to “Information Sheet 3”. However, if your rating is unsatisfactory, see your teacher for further instructions.
11. Read the information written in the “Information Sheets 3”. And Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
12. Accomplish the “Self-check 3” in page.
13. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 3).
14. If you earned a satisfactory evaluation proceed to “information sheet 4”. However, if your rating is unsatisfactory, see your teacher for further instructions
15. Read the “information sheet 4” and try to understand the procedures discussed.
16. Accomplish the “Self-check 4”.
17. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 4).

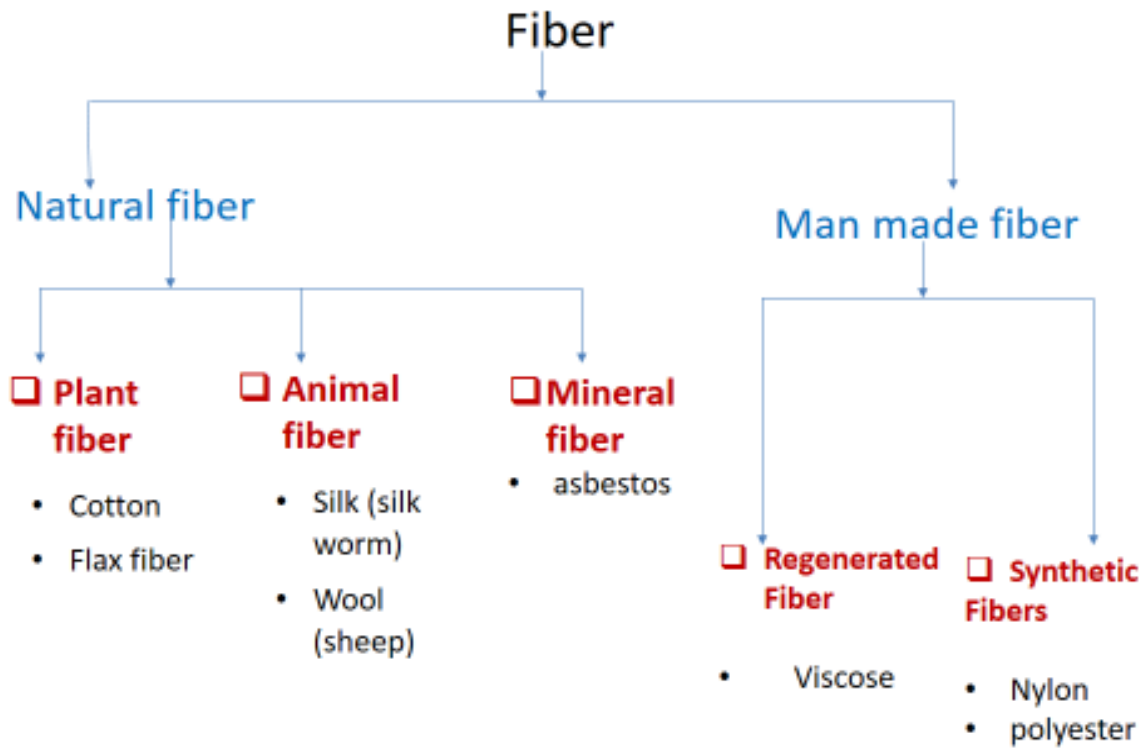


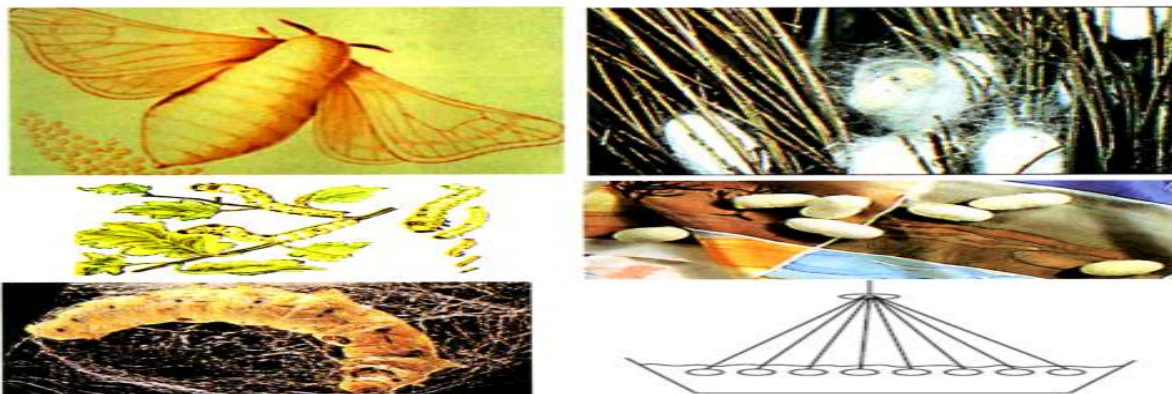
18. If you earned a satisfactory evaluation proceed to “Information Sheet 5”. However, if your rating is unsatisfactory, see your teacher for further instructions.
19. Read the information written in the “Information Sheets 5”. And Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
20. Accomplish the “Self-check 5”.
21. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 5).
22. If you earned a satisfactory evaluation proceed to “information sheet 6”. However, if your rating is unsatisfactory, see your teacher for further instructions
23. Read the “information sheet 6” and try to understand the procedures discussed.
24. Accomplish the “Self-check 6” in page.
25. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 6).
26. Accomplish the “operation sheet 1”.
27. Do the “LAP test” in page _ (if you are ready). Request your teacher to evaluate your performance and outputs. Your teacher will give you feedback and the evaluation will be either satisfactory or unsatisfactory. If unsatisfactory, your teacher shall advice you on additional work. But if satisfactory you can proceed to other learning outcome.

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| Information Sheet-1 | Introduction to fiber |
|----------------------------|------------------------------|

1.1. Classification of Fibers

Textile fibers are classified by many systems, The classification based on the principal origin of the fiber (natural or man-made), chemical type (cellulosic, man-made cellulosic), generic term (seed, hair, rayon) and common names and trade names of the fibers (cotton, viscose, rayon). It also classified based on their length (filament and staple fiber). All natural fibers except silk are staple fibers. All man-made fibers are filament fibers.





1.2. Methods of mixing of fiber

1.2.1. Objectives of mixing

The various objectives of mixing are as under –

- to get the required characteristics of end product;
- to compensate for variations in the characteristics of the raw material;
- to hold down raw material cost;
- To achieve effects by varying colour, fibre characteristics and so on.

1.2.2. Types of Mixing/Blending

- Stack mixing
- Bale mixing
- Flock blending
- Lap blending
- Web blending
- Sliver blending

Stack Mixing

- This system of mixing is often called 'sand witch mixing'.
- This is most common way to blend different kind of fibres.



- In this system, fibres are to spread in a bin in horizontal layers and cut in vertical slices.
- In order to achieve the homogeneity, this process is carried out for twice.

Bale Mixing

- This is carried out at the start of blow room process.
- About 40 to 80 bales are laid out for simultaneous flock extraction.
- With careful use, this enables the yarn properties to be maintained almost uniform.
- This type of mixing is very favorable, if all bales have same average values for length, fineness, strength, trash, etc.
- This type of mixing is unsuitable for strongly differing fibers for example cotton and synthetic fibers.

Flock Blending

- Flock blending is carried out at blow room itself.
- Flocks are very small tufts of fiber.
- It is also carried out for synthetic fiber mixing after opening out the fiber by bale opener.
- It generally occurs in uncontrolled manner.
- It can be made in controlled manner if weighing pan and mixing blenders are used.
- It has the same kinds of advantages and disadvantages as the bale mixing has.

Lap Blending

- This is hardly used now, but was previously used occasionally for blending of cotton and synthetic fiber.
- For this, a doubling scutcher is needed, on which 4-6 laps could be laid.
- These laps are processed with a beater and re condensed in a shape of lap sheet with the help of a pair of cages.



- Lap blending provides very good transverse blending and also the longitudinal blending.
- This is an uneconomical process as it essentially requires additional machine and process.

Web Blending

- Its major objective is but to achieve better uniformity at the stage of comber lap as well as to obtain fiber blend in comber lap. In addition, this technique is also used for non-woven.
- Now a days the technique is hardly used in industry. Now in spite of web doubling, sliver doubling is used at draw frame stage.
- However, web blending provides better longitudinal as well as transverse blend comparing to that of sliver blending.

Sliver Blending

- This technique is used for blending of natural fibers and synthetic fibers.
- It is carried out draw frame stage.
- For this, each material is to be processed separately up to the stage of draw frame.
- Desired blend ratio can be obtained by selecting suitable number of slivers of the fibers to be blended.
- This provides high degree of homogeneity of blends in longitudinal direction.

1.2.3. Compatibility of constituent fibers

- For trouble free processing, blended fibers must be compatible in respect of
 - Length
 - Fineness
 - Strength
 - Elongation



1.3. Bale blooming

It is important to remove the bale ties and allow the bales to bloom before the cotton is used. Blooming enables the cotton to relax and absorb moisture that increases the fiber strength and reduces subsequent fiber damage.

1.4. Bale lay-down

Arranging of conditioned and bloomed bales according to our mixing plan to feed for the machines. It is very important to arrange the bales to minimize “Quality Waves” created by fiber variations found between bales.

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| Self-Check -1 | Written Test |
|----------------------|---------------------|

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is the difference b/n cotton and wool? (3 point)
2. What is the difference b/n polyester and nylon? (3 point)
3. What is the difference b/n wool and silk? (4 point)
4. What are the objectives of mixing? (3 point)
5. List the properties that are compatibility of constituent blended fibers. (3 point)



Note: Satisfactory rating - 16 points

Unsatisfactory - below 16 points

Answer Sheet

| |
|---------------|
| Score = _____ |
| Rating: _____ |

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____

3. _____

4. _____

5. _____



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| Information Sheet-2 | Adjusting Machine Settings According To Product Requirements |
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2.1. Introduction

Perform pre-spinning operation is activities carried out before spinning operation. It is generally the pre-condition activities for spinning operation or yarn formation process.

2.2. Adjusting machine settings

The pre-spinning machineries are adjusted depending on the product requirements. So pre-spinning machine setting may include: opening roller RPM, Roller setting gap, RPM of feeding roller and etc.

2.3. Product requirements

After deciding what product or output looks like, finally its requirements or input are searching out. **Example** product requirements may include: Fiber length, length uniformity, fiber strength, micronaire, color and etc.

2.3.1. Count

Wrong count of sliver leads to more end breakage rate during spinning, weaving and knitting.

2.3.2. Tension

During pre-spinning operation the fiber must be free from slackness or looseness. This slackness is removed by applying tension. Tension exerted on the fiber is coming from different fiber opening components in pre-spinning section.

In pre-spinning section there are different machineries, like that of automatic bale opener, carding machines, draw frame machine.

2.3.3. Weight

Before delivering the product of pre-spinning (i.e. Fiber web, sliver, Lap) to the market its weight must be measured to check whether it meets the market specification.

2.3.4. Strength

The strength of pre-spinning section product is pre-defined or pre-specified first. Then its measurement is done by clamping and breaking the fibers with 1/8-inch gauge spacing between the clamp jaws. The strength reported is the force in grams required to break a bundle of fibers one tex unit in size.



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| Self-Check -2 | Written Test |
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define sliver count (1 points)
2. Write different product requirements (4 points)
3. Why we adjust machine setting (3 points)

Note: Satisfactory rating – 8 points

Unsatisfactory - below 8 points

Answer Sheet

| |
|---------------|
| Score = _____ |
| Rating: _____ |

Name: _____

Date: _____

1. _____

2. _____

3. _____



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| Information Sheet-3 | Checking Specifications to identify requirements for production |
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The output or product quality is decided by the quality of input materials, so to decide the input materials first we need to specify the standard of product or output. Then standing on this the input is searched on and the machine is set up.

❖ **The following are the technical points in the pre spinning:**

- Opening in blow room means opening the cotton in small pieces. The operation of opening means to increase volume of flocks while the number of fiber in the flock remains constant. That is the specific density of material is reduced.
- If the size of dirt particle is larger, it can be removed easily.
- A lot of impurities and contamination are eliminated at the start of the process.
- As much opening of cotton will be more, cleaning result will be more acceptable. But this cleaning of cotton is done on the basis of high fiber loss. High roller speed gives more better cleaning effect but also more stress on fiber. So roller speed is adjusted at a nominal speed so there should be well opening of cotton and it does not effect of quality of fiber.
- Cleaning efficiency of cotton is depending upon trash percentage. The cleaning efficiency is different for different varieties of cotton with same trash percentage.
- If the opening of cotton is done well in initial stage then cleaning becomes easier. As surface area of opened cotton is more, so therefore cleaning is more efficient.
- In traditional method more number of machine are used to open and clean natural fiber.
- If automatic bale opener machine is used, the tuft size of material should be as small as possible. In this way more efficiency of machine is achieved and machine stopping time is reduced.
- For the opening of cotton, use inclined spiked lattice (tray) at the initial stage always a better way of opening of cotton with minimum damage.
- Mechanical action on fibers creates some problems in the quality of yarn in the form of neps.



- In beating operation by using a much shorter machine sequence, fibers with better elastic properties. In this way spin ability can be produced.
- Stickiness in the cotton affects the process very badly in the way of production and quality.
- It is necessary to control the temperature inside the department, when use stickiness cotton.
- Released of dust particles into the air occurs whenever the raw material is rolled beaten or thrown about. Accordingly the air at such position is sucked away. For the removal of dust perforated drums, stationary drums are used.

❖ Following are the factors which affects the yarn quality:

- Fiber length
- Types of drafting
- Delivery speed
- Fiber fineness
- Auto leveler setting
- Break draft
- Total draft



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| Self-Check -3 | Written Test |
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. List the main specifications to perform pre spinning process. (4 points)
2. What the factors which affects the yarn quality in pre spinning process? (4 points)

Note: Satisfactory rating – 8 points Unsatisfactory - below 8 points

Answer Sheet

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|---------------|
| Score = _____ |
| Rating: _____ |

Name: _____

Date: _____

1. _____

2. _____



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| Information Sheet-4 | Loading raw materials |
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Loading means adding the goods on to truck or cargo. Loading of goods is often required when the goods are delivered to the machine. When the goods are bulky and complex, poor handling of the goods can often cause damage to the goods and hence this task is often outsourced to the transporting facilities by the companies.

It is of great significance since there is a lot of risk involved and hence it is advised not to do the loading and unloading themselves as there may be a possibility of a valuable loss of goods. There are many independent loading and unloading service providers who make sure that the goods reach the destination in the perfect condition and then they also unpack the goods at the destination with utmost care and attention. Mostly the customers should choose a moving company which has some prior experience.

Depending on type of pre-spinning machine the raw materials to be loaded are different.

Example:

- A raw material for blow room machine is in the form of cotton bale and its output is in the form of tufts.
- A raw material for carding machine is in the form of small tufts and its output is in the form of sliver.
- A raw material for draw frame machine is in the form of sliver and its output also same.
- A raw material for comber machine is in the form sliver and its output is in the form of lap.
- A raw material for roving machine is in the form sliver and its output is in the form of roving.



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| Self-Check -4 | Written Test |
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write the raw material for blow room, carding, combing, draw frame and roving frame machine. (2 point)
2. Write the output product for blow room, carding, combing, draw frame and roving frame machine.(2 point)

Note: Satisfactory rating - 4 points Unsatisfactory - below 4points

Answer Sheet

| |
|---------------|
| Score = _____ |
| Rating: _____ |

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____



| | |
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| Information Sheet-5 | Reporting non-conforming materials |
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5.1. Nonconformity: the nonfulfillment of a specified requirement

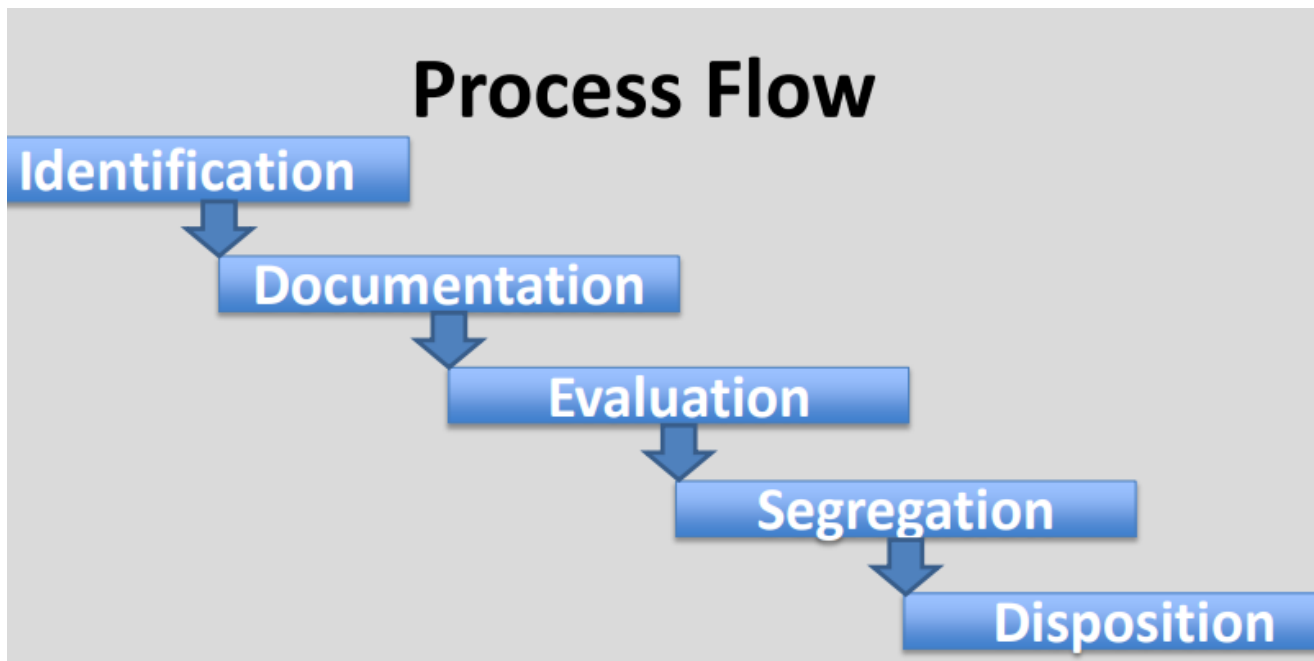
5.2. Non- conformances

- ✓ Nonconforming Product is product that does not fulfill its specified requirements
- ✓ Nonconformance's can occur in both product and process
- ✓ Nonconforming processes can lead to nonconforming product.

5.3. Nonconforming Product - Regulation

“Each manufacturer shall establish and maintain procedures to control product that does not conform to specified requirements....”

“....The procedures shall address the identification, documentation, evaluation, segregation, and disposition of nonconforming product.”



5.3.1. Identification

Sources of Nonconforming Product

- Received components/material that fail incoming inspection

Example

- ✓ Specification: 6 +/- 1 inch
- ✓ Inspection result: 8 inch
- ✓ This is nonconforming product

- Products/components that fail inspection or test during manufacturing

Example

- ✓ Temperature range: 300 ± 10° F



- ✓ Temperature set on bonding machine: 280° F
- ✓ This is nonconforming process:

- Product returned to manufacturer with defects

Example

- ✓ If a catheter is supposed to fit inside a 6 French guide and during procedure it does not fit.
- ✓ Handled within the complaint system*
- ✓ *not within the scope of this talk

5.3.2. Documentation

- Form that identifies the material, the problem, evaluation, segregation, the investigation (if any), disposition and signatures
- Standard operating procedure (SOP)
- Work Instruction (WI)

5.3.3. Evaluation

... The evaluation of nonconformance shall include a determination of the need for an investigation and notification of the persons or organizations responsible for the nonconformance. The evaluation and any investigation shall be documented.

5.3.4. Segregation

You must segregate non-conforming product to ensure it is not released.

Examples

- ✓ Locked Cages
- ✓ Digital Controls
- ✓ Separate Area

5.3.4. Disposition

Each manufacturer shall establish and maintain procedures that define the responsibility for review and the authority for the disposition of nonconforming product. The procedures shall set forth the review and disposition process.

Typical Nonconforming Product in Dispositions

- Scrap
 - ✓ Where you decide not to use the product
 - ✓ destroy
- Downgrade
 - ✓ Reverting back to a safe and effective older version when there is a problem with an upgrade
- Use as Is



- ✓ Use the Nonconformance as is when it does not affect the safety and effectiveness of the final product

- Rework

Each manufacturer shall establish and maintain procedures for rework, to include retesting and reevaluation of the nonconforming product after rework to ensure that the product meets its current approved specifications.

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| Self-Check -5 | Written Test |
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What does it mean non-conforming materials? (4 point)
2. Write the process flow of non- conforming materials. (4 point)



Note: Satisfactory rating – 8 points

Unsatisfactory - below 8 points

Answer Sheet

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|---------------|
| Score = _____ |
| Rating: _____ |

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____



| | |
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| Information Sheet-6 | Keeping machine area clean |
|----------------------------|-----------------------------------|

The workplace and the machine must be cleaned before starting work, during working and after work is finished.

- Cleaning of the clearer under the creel rollers.
- Cleaning of the top drafting rollers with wet cloth.
- Take out fan waste at regular intervals.
- Clean top clearers and bottom clearers time to time.
- Clean coiler calendar roller sides time to time.
- Clean drafting rollers sides time to time.
- Cleaning scanning rollers surroundings as per requirement.
- Clean the suction pipes time to time.
- Clean delivery rolls and trumpet regularly.

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| Self-Check -6 | Written Test |
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is purpose of cleaning? (4 point)

Note: Satisfactory rating - 4 points

Unsatisfactory - below 4points

Answer Sheet

| |
|---------------|
| Score = _____ |
| Rating: _____ |

Name: _____

Date: _____

Short Answer Questions

1. _____



| | |
|-------------------|--|
| Operation Sheet 1 | Adjusting machine settings according to Product requirements |
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Method of adjust machine setting

Step 1- identify requirements of the product

Step 2- prepare tools and equipment needed for adjusting

Step 3-if the machine is running, you should be shutdown

Step 4- removal of dust particles from the machine and around the machine by air

Step 5- adjusting machine setting

| | |
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| LAP Test | Practical Demonstration |
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Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 1 hour.

Task 1. Adjusting machine setting according to product requirement



List of Reference Materials

- 1- Chemical Technology in the Pre-treatment Processes of Textiles by S.R.Karmakar, volume 12, page 1-3
- 2- Spinning I hand out by *PNRJ*
- 3- Eremina, K.I. Textile Fibers: Their Primary processing and Properties
- 4- Analysis on the Defects in Yarn Manufacturing Process & its Prevention in Textile Industry by Neha Gupta
- 5- Cotton: Science and technology Edited by S. Gordon and Y-L. Hsieh