Basic textile operations

NTQF Level -I

Learning Guide -41

Unit of Competence: -: Perform Spinning

Operations

Module Title:-: Performing Spinning Operations

LG Code: **IND BTO1 M11 LO4-LG-41**

TTLM Code: **IND BTO1TTLM 0919v1**

LO 3: check quality 0f produced Yarn

Instruction Sheet	Learning Guide #-

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

- Checking produced yarn against quality standard
- Assessing non-conformances yarn and faults
- Rectifying or reporting yarn faults

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 produced yarn against quality standard
- Assess non-conformances yarn and faults
- Rectify or report yarn faults

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 20.
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" **in page -.**
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 or go back to Learning Activity #1.
7. Submit your accomplished Self-check. This will form part of your training portfolio.

Information Sheet-1	Checking produced yarn against quality standard

1. Checking produced yarn against quality standard

Yarn Faults:

Yarn faults are very important characteristics which affecting spun yarn ability process and fabric appearance. Not only affect the appearance of fabric but also create hamper in spinning operation. Thick places in yarn are often caused by soiling or damaged machine parts. Thin places can occur, excessive drafts in the drafting assembly. Yarn faults are responsible for rejection and down grading of yarn and low productivity due to higher end breakage in further process. If yarn **quality** become poor then it is not possible to make good quality fabric. So, maintaining yarn defects are very important for spinners.

Fig: Various types of yarn faults

It is still not possible to produce a yarn without faults though you use the most sophisticated spinning machineries but it is difficult to produce defect free yarn due to the lacking in the manufacturing processes and raw material quality.

We can classify yarn faults according to causes of time:
1. Frequently Occurring Faults(Analyzed by Uster Evenness Tester)
2. Seldom Occurring Faults(Scanned by Uster Classimat Tester)

1. Frequently occurring faults:

Frequently occurring faults include thick and thin places, neps which are measured by evenness tester. These faults occur in the range of 10-5000 times per 1000 meters.
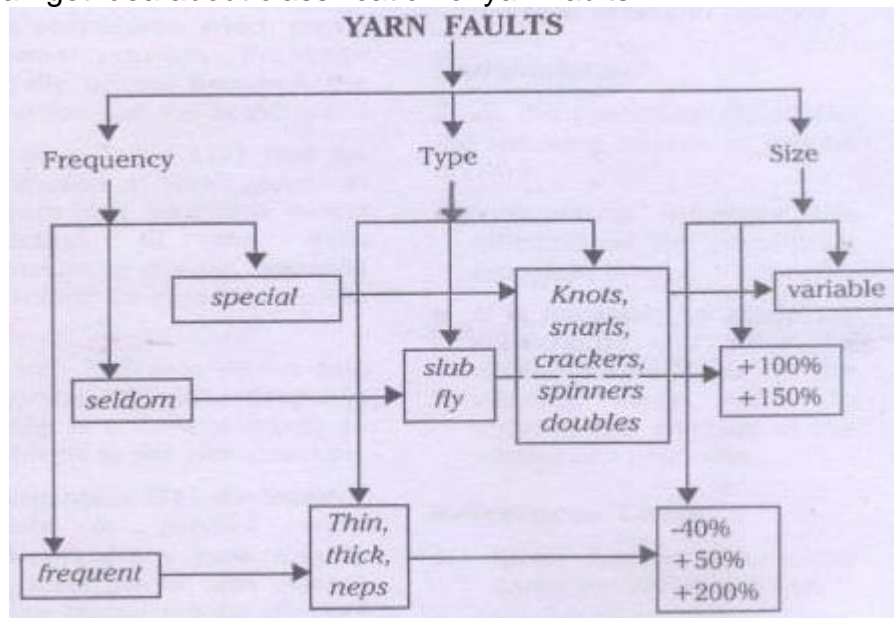
2. Seldom occurring faults:

These types of faults include slubs, spun in fly, long thin places in yarn. Seldom occurring

faults for at least 100 km of the yarn. The seldom occurring faults can be grouped into four main types, viz. Short thick, long thick and long thin faults.

We can also can get idea about classification of yarn faults.

Fig.3.1. Classification of yarn faults

Following types of yarn faults occur in different process of spinning.
1. Neps
2. Slub
3. Sarl
4. Thick and thin places
5. Soft yarn/loose yarn
6. Oil Stain yarn
7. Crackers
8. Bad piecing
9. Oily slub
10. Kitty yarn
11. Hairy yarn
12. Foreign matters
13. Spun in fly
14. Cork screw yarn
15. Slough Off
16. Knots
17. Excessive Hard Yarn
18. Rust Stain
19. Low Strength of Yarn

Though faults free yarn is not possible to manufacture. But many of these faults can be avoided by keeping the **spinning machine** clean as well as using optimized settings. If cotton quality become good then also possible to produce comparatively less faulty yarn.

Self-Check -1	Written Test

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

1. List at least 5 yarn faults in spinning process. (5 pts.)

Answer sheet

Note: **Satisfactory rating - 3 points**   **Unsatisfactory - below 3 points**

Score = _____

Rating: _____

Name: _____   Date: _____

1. _____
_____
_____
_____
_____

Information Sheet-2	Assessing non-conformances yarn and faults

2. Assessing non-conformances yarn and faults

Types of Yarn Faults:

There are various types of yarn faults. Yarn faults are defined according to their length and width. The length is specified in centimeters and the width as multiple of the normal diameter of a yarn.

Yarn Quality Parameters to Be Tested and Evaluated. The roving bobbin of 0.90 hank was taken to Spin 10s' and 33s Nm and 1.20 hank roving was used to spin 64s and 72s Nm. The Spindle speeds were kept at 5500 rpm and 6500 rpm. Only when the speed exceed 6500 rpm and above the yarn quality deteriorated due to excessive end breakages and it was not practical to run the machine at speeds exceeding 6500 rpm as the stoppage time of the machine to repair broken threads has become very high. A total of 139\20 readings for each count was taken to get the average yarn quality characteristics like CV% of TPI, U%, Thin place/km, Thick place/km, Neps/km, Rkm values, % of Elongation and Hairiness Index. The quality particulars of the yarn have been tested and the results have been analyzed. It can be seen from the test results that there is vast improvement in yarn quality, obtained with yarn produced on improved charkha and the quality levels are comparable with norms for mill made yarn of similar counts. There is also appreciable improvement in yarn quality when shifts are made from Hand-Operated Charkha to Motorized charkha and 16 Spindle Improved Charkha for all counts. This is because of the uniform twist flow to the yarn during charkha spinning as the spindles are driven by motor; this ensures constant speed of rotation of the machine parts. This stabilization of TPI has yielded better yarn quality.

1. **Twist per inch (TPI):** is given to the yarn, which is kept constant for all the Spindle The trial was taken on 8 Spindle ring frame Nm at a constant speed of 5500 rpm and 6500 rpm. The yarn was tested for various parameters like CV% of TPI, U%, Thin places/km, Thick places/km, Neps/km, Rkm values, Percentage of Elongation and Hairiness Index. Average of 20 readings for each quality particulars is given in the Table blow.

Table: 5.1   Spindle speed: 5500 rpm

SL.No	Particulars	8 Spindle Hand operated Charkha	8 spindle Motor Operated Charkha	16 spindle Improved Charkha	SITRA norms	Percentage Improvement between 3 and 4	Percentage improvement between 3 and 5	Percentage Improvement between 4 and 5
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	Actual Count (Nm)	10^s	10^s	10^s	10^s	-	-	-
2	TPI	10	10	10	NA	-	-	-
3	CV% of TPI	9.8	7.6	3.5	NA	22.4	64.2	53.9
4	U %	19.56	18.16	16.56	13.5	7.15	15.3	8.8
5	Thin places /km	1080	200	192	200	81.4	82.2	4
6	Thick places /km	985	480	463	500	48.6	53.0	3.5
7	Neps / km	430	430	415	245	0	3.48	3.48
8	Total imperfections	2495	1110	1070	945	55.5	57.1	3.6
9	RKM g/tex	9.44	11.88	12.45	13	25.8	31.8	4.8
10	Elongation %	6.11	6.25	5.95	6.5	2.29	2.6	4.8
11	Hairiness index	7.98	10.87	9.56	8.0	36.2	19.8	12.0

Quality Parameters

2. **U%**:- U % means uniformity index of the yarn tested is lister evenness tester (Evenness of yarn). The lower U% means better quality. The U% rating of 8 Spindle shows higher values than other two spindle. There is a 15.3 percentage improvement of U% in the 16 Spindle Improved when compared with 8 Spindle in Table- 5.1. However the SITRA norms give lower values. Among the three spindle, 16 spindle yielded better yarn with 16.56 U% for 10s Nm at 5500 rpm.

3. **Thin Places/Km:-**Table indicates the performance of 10Nm yarn in terms of thin places (Yarn imperfections). There is a 82.2 percentage improvement in the

yarn imperfections for Nm count at 5500 rpm of spindle speeds, between hand operated 8 spindle yarn and 16 Spindle. The 16 Spindle has given better quality than SITRA norms. The 8 Spindle shows higher values because of the irregular motion of spindle. rotation of fluted rollers. But, the 16 Spindle Improved shows4 percentage improvement when compared with 8 Spindle Motor Operated and 82.2 percentage improvement when compared with Hand Operated because of smooth rotation of drafting rollers and no vibration in improved machine. This has confirmed that 16 spindle improved charkha has yielded better results among the charkhas selected for the study. Even at higher speeds of 6500 rpm there continues to be reduction of thin places in yarn spun on improved.

4. **Neps/Km**

Neps are defined as entanglement of immature fibers into small ball the size of a pinhead. The neps undesirable both in the yarn and the fabric as they appear as fabric defect the dye applied on to the fabric uniformly, because they consist of immature fibers. Therefore steps are taken to reduce the nep generation in the spinning process. It is the blow room and the carding departments that contribute to nep generation. The neps of 16 Spindle improved percentage improvement.

5. **Total Imperfections/Km**

The total imperfections are the sum of thin place, thick place and neps/Km of yarn. It goes to show the total yarn defects in a Kilometer of yarn length. Total imperfections influences loom performance and over all fabric appearance. Less number of imperfections in yarn is preferred for better yarn quality. The Table-5.1 indicates that the total imperfections of 10 Nm count shows 57.1 .

6. **RKM Values**

Stronger the yarn, higher will be the RKM value. Stronger yarns produce stronger cloth and spin better without end breakage. The RKM value of 16 Spindle Improved shows 31.8 percentage and 4.8 percentage improvement when compared with 8 Spindle Hand Operated Charkha and 8 Spindle respectively at 5500 rpm of spindle speed for 10s Nm. Means stronger yarns. Hence, it can be inferred that 16 Spindle

7. **Percentage Of Elongation**

8. **Hairiness Index**

9. **Double end**

10. Contamination

Self-Check -2	Written Test

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

1. Why testing quality of yarn is important? (5 pts.)

Answer sheet

Note: **Satisfactory rating - 3 points**   **Unsatisfactory - below 3 points**

Score = _____

Rating: _____

Name: _____   Date: _____

1. _____
_____
_____
_____
_____

Information Sheet-3	Rectifying or reporting yarn faults

2 Rectifying or reporting yarn faults

Yarn Faults, Causes and Its Remedies

1. **Slubs**: - an abnormally thick place or lump in yarn showing less twist at that place. Effect more end breaks in the next process, damaged fabric appearance, Shade variation in dyed fabrics.

   Caused by
   - accumulation of fly and fluff on the machine parts
   - poor carding
   - defective ring frame drafting
   - Bad piecing
   - Improperly clothed top roller clearers.

   Slubs rectification:-
   - Machine surfaces to be maintained clean proper functioning of pnemafil/roller clearers to be ensured
   - broken teeth gear wheel to be avoided
   - proper meshing to be ensured
   - Better fiber individualization at cards to be achieved
   - optimum top roller pressure & back zone setting at ring frame to be maintained.

2. **Neps**:- yarn containing rolled fibre mass, which can be clearly seen on black board at close distance; measurable on uster imperfection indicator. Effect damaged fabric appearance, shade variation in the dyed fabrics, an abnormally thick place or lump in yarn showing less twist at that place is called neps.

   Caused by
   - accumulation of fly and fluff on the machine parts
   - poor carding
   - Defective ring frame drafting
   - bad piecing
   - improperly clothed top roller clearers.

   neps rectification:

   - machine surfaces to be maintained clean
   - proper functioning of pnemafil/roller clearers to be ensured
   - broken teeth gear wheel to be avoided
   - proper meshing to be ensured
   - better fiber individualization at cards to be achieved.

3. **snarl yarn with kinks(twisted onto itself)**:- due to insufficient tension after twisting effect entanglement with adjacent ends causing a break, damaged fabric appearance, shade variation in dyed fabrics.

   caused by

   - improper meshing of gear wheels mixing of cottons varying widely in fiber lengths
   - use of immature cottons causes higher than normal twist in the yarn,

> ➤ presence of too many long thin places in the yarn.

snarl rectification:-
- ➤ Optimum twist to be used for the type of cotton processed
- ➤ drafting parameters to minimize thin places in the yarn to be adopted
- ➤ the yarn to be conditioned
- ➤ correct tension weights
- ➤ slub catcher settings to be employed at winding.

4. **Thick and thin places**:- measurable by uster imperfection indicator and observable on appearance effect eccentric top and bottom rollers.

   Caused by

   - ➤ insufficient pressure on top rollers
   - ➤ worn and old aprons and improper apron spacing
   - ➤ improper meshing of gear wheels
   - ➤ mixing of cottons varying widely in fiber lengths and use of immature cottons causes eccentric top and bottom rollers
   - ➤ Insufficient pressure on top rollers worn and old aprons and improper apron spacing.

   Rectification:-

   - ➤ eccentric top and bottom rollers to be avoided
   - ➤ top arm pressure checking schedules to be maintained strictly
   - ➤ wide variation in the properties of cottons used in the mixing to be avoided
   - ➤ Better fiber individualization at cards to be achieved and correct spacers to be utilized.

5. **Soft yarn: -** yarn which is weak indicating lesser twist effect more end breaks in subsequent processes. Causes shade variation in dyed fabrics.

   Caused by

   - ➤ slack tapes dirty jockey pulleys
   - ➤ improper bobbin feed on the spindle
   - ➤ less twist in the yarn
   - ➤ bad clearing at the traveler

   Soft yarn rectification:

   - ➤ vibration of bobbins on the spindles to be avoided
   - ➤ proper yarn clearing to be ensured
   - ➤ periodic replacement of worn rings and travelers to be effected,

6. **Oil stained yarn**: - yarn stained with oil effect damaged fabric appearance, occurrence of black spot in fabric.

   Caused by.

   - ➤ careless oil in the moving parts
   - ➤ over head pulleys etc
   - ➤ piecing made with oily or dirty fingers
   - ➤ careless material handlings.

   Oil stained yarn rectification

   - ➤ appropriate material handling procedures to be followed
   - ➤ oilers to trained in proper method of lubrication
   - ➤ clean containers to be utilized for material transportation

7. **crackers very small snarl-like places:-** in the yarn which disappear when pulled with enough tension or yarn with spring like shape effect more breaks in winding, more noticeable in polyester and cotton blended yarns.
   Caused by

   - ➢ mixing of cottons of widely differing staple length
   - ➢ closer roller settings
   - ➢ eccentric top and bottom rollers
   - ➢ non optimum temperature and relative humidity in the spinning shed
   - ➢ Over spinning of cottons.

   Crackers rectification

   - ➢ optimum top roller pressure to be maintained
   - ➢ mixing of cottons varying widely in fibre length to be avoided
   - ➢ use of optimum roller settings
   - ➢ use of properly buffed rollers free from eccentricity to be ensured

8. **bad piecing unduly thick piecing:-** in yarn caused by over end piecing effect more end breaks in subsequent process, increase in hard waste.
   Caused by

   - ➢ wrong method of piecing and over end piecing
   - ➢ twisting the ends instead of knotting

   Rectification

   - ➢ tenders to be trained in proper methods of piecing
   - ➢ separators to be provided
   - ➢ excessive end breaks in spinning to be avoided☐

9. **oily slub:-** slub in the yarn stained with oil effect more end breaks in the ensuring process, damaged fabric appearance, shade variation in dyed fabrics
   caused by

   - ➢ accumulation of oily fluff on machinery parts
   - ➢ poor methods of lubrication in preparatory processes
   - ➢ negligence in segregating the oily waste from process waste

   oily slub rectification

   - ➢ yarn contact surfaces to be kept clean
   - ➢ oilers to be trained in correct procedures of lubrication
   - ➢ proper segregation of oily waste from process waste

10. **kitty yarn effect** damaged fabric appearance, production of specks during dyeing, needle breaks during knitting, poor performance during winding, causes ineffective cleaning in blow room and cards.
    Caused by

- ➢ use of cottons with high trash
- ➢ too many seed coat fragments
- ➢ **rectification**
- ➢ cleaning efficiency of blow room and cards to be improved
- ➢ optimum humidity in the departments to be ensured

11. **hairiness protrusion** of fibre ends from the main yarn structure effect more end breaks in winding, uneven fabric surface, beads formation in the fabric in the case of polyester/cotton blends
    caused by

- use of cottons differing widely in the properties in the same mixing
- use of worn rings and lighter travellars
- maintaining low relative humidity,
- closer roller settings and very high spindle speeds

hairiness rectification

- use of travellars of correct size and shape and rings in good condition to be ensured periodic replacement of travellars
- suitable roller settings to be maintained
- optimum relative humidity to be maintained in the spinning room
- wide variation in the properties of cottons used in the mixing to be avoided

12. **foreign matters metallic parts**, jute flannel and other similar foreign matters spun along with yarn effect breaks during winding, formation of holes and stains in cloth, damaged fabric appearance.

caused by

- improper handling of travelers
- improper preparation of mixings

rectification

- removal of foreign matters(such as jute fibres,colour cloth bits) to be ensured during
- preparation of mixing installation of permanent magnets at proper
- places in blow room lines to be ensured

13. **spun in fly fly or fluf**f:- either spun along with the yarn or loosely embedded on the yarn effect more breaks in winding

caused by

- accumulation of fluff over machine parts
- fanning by workers
- failure of over head cleaners
- malfunctioning of humidification plant

rectification

- machinery surfaces to be kept clean by using roller pickers
- performance of over head cleaners and humidification plants to be closely monitored

14. **cork screw yarn** it is a double yarn which one yarn is straight and other is coiled over it effect breaks during winding causes streaks in the fabric.

Caused by

- feeding of two ends (instead of one) in ring frame
- lashing -in ends in ring frame.

Rectification

- tenders are to be trained in piecing methods(or) practices
- pneumafil ducts to be kept clean and properly set

Self-Check –3	Written Test

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

1. Write at least five faults with their definition, cause and rectification.(10 pts.)

Note: **Satisfactory rating - 5 points**   **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____   Date: _____

1. _____
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