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1. Basic Textile Terms of Spinning:

Fiber: The fundamental component used in making textile yarns and fabrics. Fibers are fine substances with a high ratio of length to thickness. They can be either natural (e.g. cotton, wool, silk etc.) or synthetic (e.g. polyester, nylon, acrylic etc.).

Blow room Lap: The Loose strand, roughly parallel, untwisted fiber sheet produced in blow room.

Chute feed system: It is a system of feeding small tufts of fibers directly from blow room to a series of cards, arranged in a circuit through pneumatic pipe.

Sliver: The strand of loose, roughly parallel, untwisted fibers produced in Carding.

Roving: The soft strand of carded/combed fibres that has been twisted, attenuated, and freed of foreign matter, which is a feed material to spinning.

Yarn: A continuous strand of textile fibers that may be composed of endless filaments or shorter fibers twisted or otherwise held together.

Spinning: The process of making yarns from the textile fiber is called spinning. Spinning is the twisting together of drawn out strands of fibers to form yarn.

Yarn Count/Sliver Hank

Yarn count is the numerical expression of yarn, which defines its fineness or coarseness. (Linear density).

Yarn count systems

Indirect system: English count (Ne), Worsted Count etc.

i.e. Higher the yarn number, finer the yarn.

Direct System: Tex, Denier

i.e. Higher the yarn number , Coarser the yarn.

Similarly numerical expression of fineness or coarseness of Lap, sliver & roving are called Hank.

Note: English (Ne) count system is commonly followed in India.

English Count: No. of Hanks of length 840 yds weighing in 1 pound

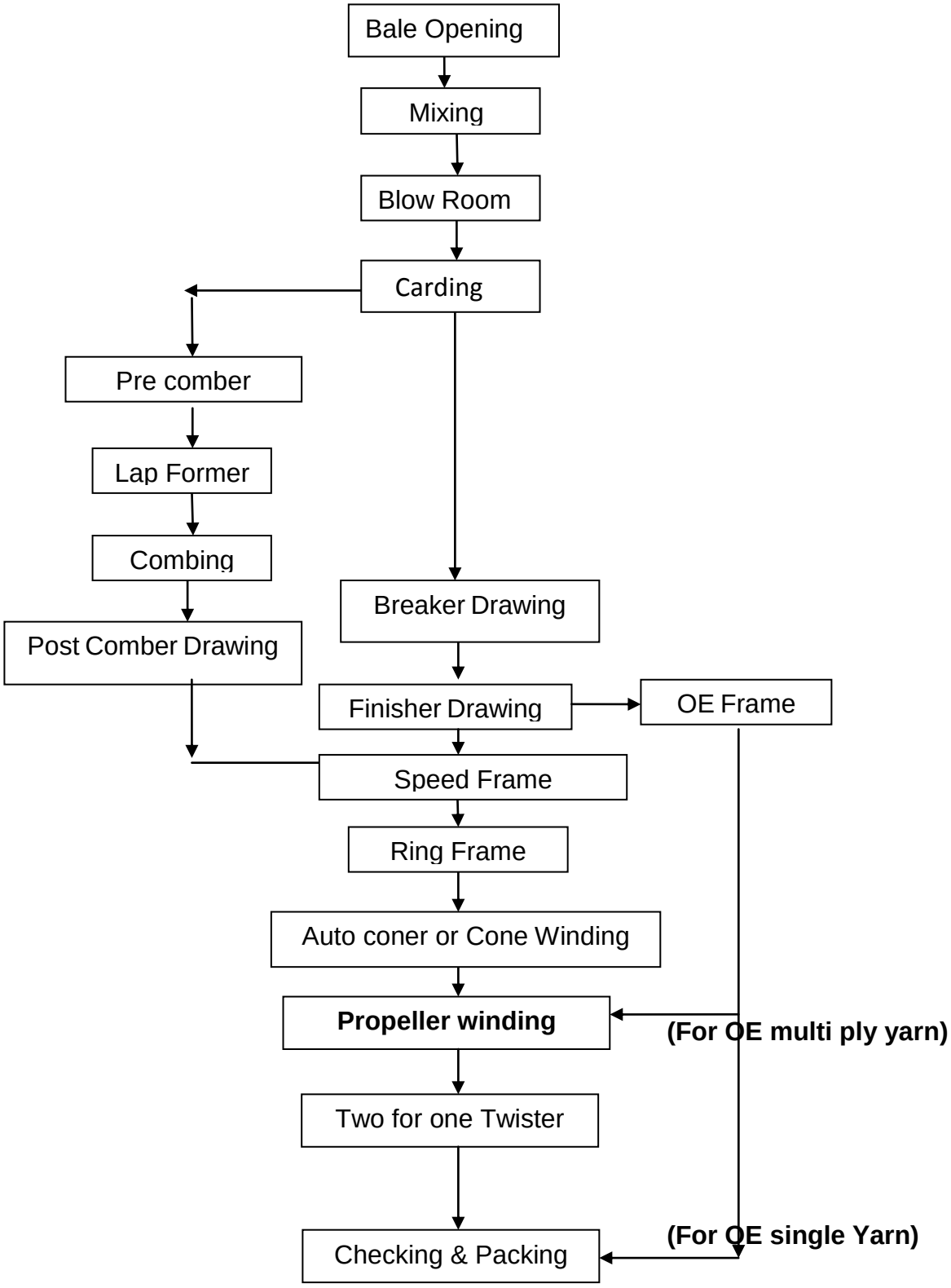
1yds: 0.9144mtrs

1lbs: 0.453 Kgs.

e.g. 40^{s} Ne = 40 hanks of 840 yds weighs 1 lbs.

20^{s} Ne = 20 hanks of 840 yds weighs 1 lbs.

2. Sequence of Spinning Process:



3. Material Flow in Spinning:

Carded Yarn Manufacturing:

TABLE-1

STAGE	MACHINE	INPUT MATERIAL	OUT PUT MATERIAL	PACKAGE FORM
Opening & cleaning	Blow Room machines	Raw cotton	Lap or chute feed	-
Carding	Card	Lap or chute feed	Card sliver	Slivers in Can
1st drawing	Breaker Draw frame	Card sliver	Drawn sliver	Sliver can
2nd drawing	Finisher Draw frame	Drawn sliver	Drawn sliver	Sliver can for Roving
Roving	Speed Frame	Drawn sliver	Roving	Roving bobbin
Spinning	Ring spinning frame	Roving	Ring-spun yarn	Spinning Cops
Post-Spinning processes	Winding(Auto Coner)	Yarn in spinning cops	Yarn package	Cone, Cheese & Hank as required
Doubling/ Plying	**Propeller winding**	**Cone/cheese**	**Plied yarn in cheese**	**Cheese**
Twisting	Two for one Twister	Parallel yarn Cheese	Plied & Twisted Yarn	Cheese or cone

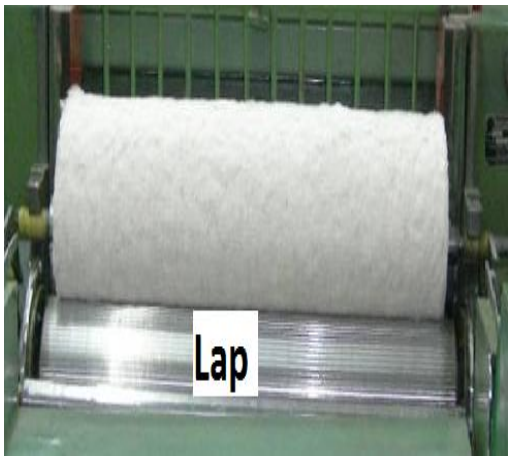
Combed Yarn Manufacturing

TABLE-2

STAGE	MACHINE	INPUT MATERIAL	OUT PUT MATERIAL	PACKAGE FORM
Opening & cleaning	Blow Room machines	Raw cotton	Lap or chute feed	-
Carding	Carding machine	Lap or chute feed	Card sliver	Carded Slivers in Cans
Pre comber Drawing	Breaker Draw Frame	Carded Sliver	Drawn Sliver	Drawn slivers in cans
Lap Formation	Super Lap or Lap Former	Drawn Slivers	Lap	Laps in spools
Combing	Comber	Lap	Combed Sliver	Combed sliver in Cans
Post comber Drawing	Finisher Draw Frame	Combed sliver	Drawn sliver	Post comber Draw frame slivers in cans
Roving	Speed Frame	Post comber Draw frame sliver	Roving	Roving bobbin
Spinning	Ring spinning frame	Roving	Ring-spun yarn	Spinning Cops

Post-Spinning processes	Winding(Auto Coner)	Yarn in spinning cops	Yarn	Cone, Cheese & Hank as required
Doubling/ Plying	**Propeller winding**	**Cone/cheese**	**Plied yarn in cheese**	**Cheese**
Twisting	Two for one Twister	Parallel yarn Cheese	Plied & Twisted Yarn	Cheese or cone

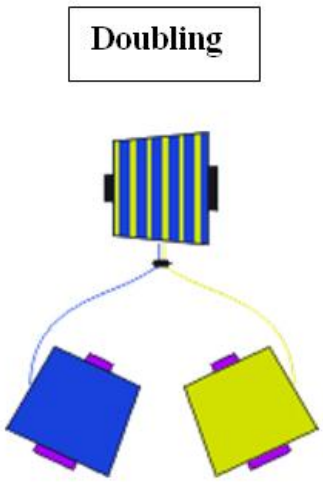
Various Package Form:



Roving Bobbin

4. Functions of Propeller Winding Machine:

- The purpose of propeller winding is to unite two or more Yarn on a package(Cheese) prior to twisting
- It essentially is doing winding of two or more single yarns together on to a suitable package to be subsequently creeled on the doubling or twisting machine.
- To provide vibration free traversing and cross winding yarn on cheese
- To improve the strength of yarn.



➢ Details of Propeller Winding Machine

Main Parts of Propeller Winding Machine:

Cone Holder:

- It is a Spindle type holder with separators for keeping cones.
- In some machines platform type cone holders, hold the cones for unwinding.
- The cone holders functions are to hold the full cones for unwinding smoothly and feed to cheese as plied yarn.

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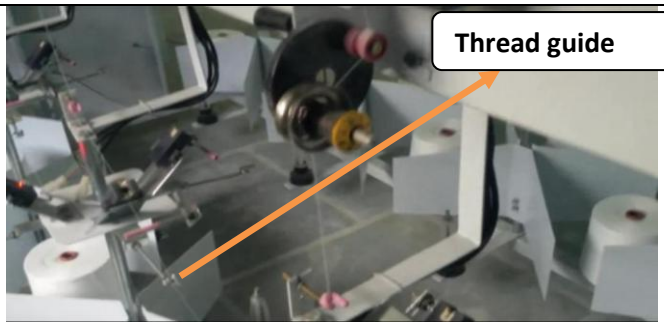
Cone holder

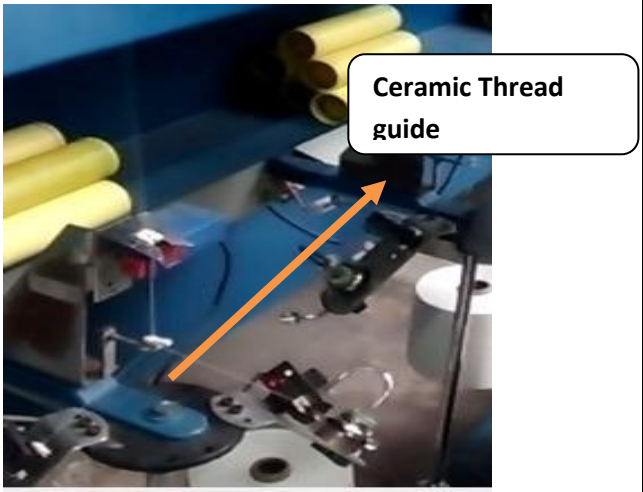
cones creeled on the machine

Cone mounted on Cone holder

Thread Guide:

- The Bottom Thread guide is to guide the yarn from single yarn cones for plying.
- The top thread guide is provided to guide the plied yarn to Cheese for final winding.
- The ceramic portion of thread guides ensures smooth passage of yarn.





Ceramic thread guide to guide plied yarn to cheese

EYC & Yarn tensioner unit:

- The EYC clears the yarn defects and Yarn tensioner provides sufficient tension to the yarn during unwinding from cone to winding on to cheese.

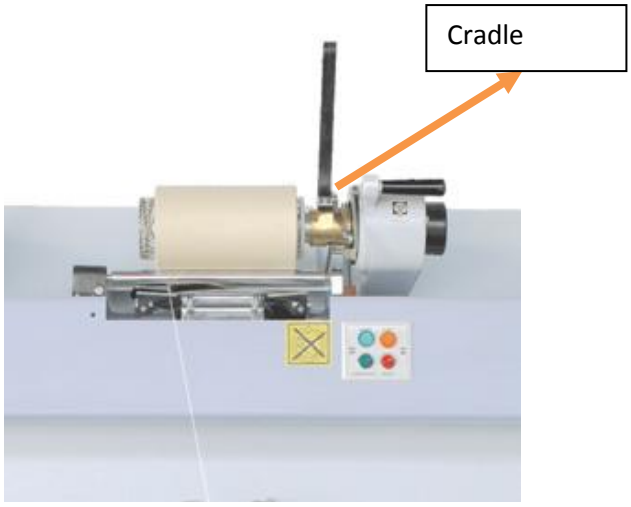
EYC and Yarn Tensioner unit

Cradle:

- Its function is to hold Cheese on the winding head. It lies on the upper part of machine.

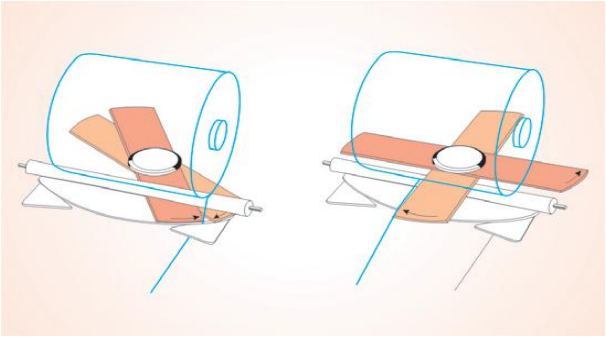
Counter rotating Blades:

- In propeller winding the yarn traverse is facilitated by the two counter rotating blades beneath the winding rollers.
- The movement of the counter rotating blades traverses the yarn during winding.

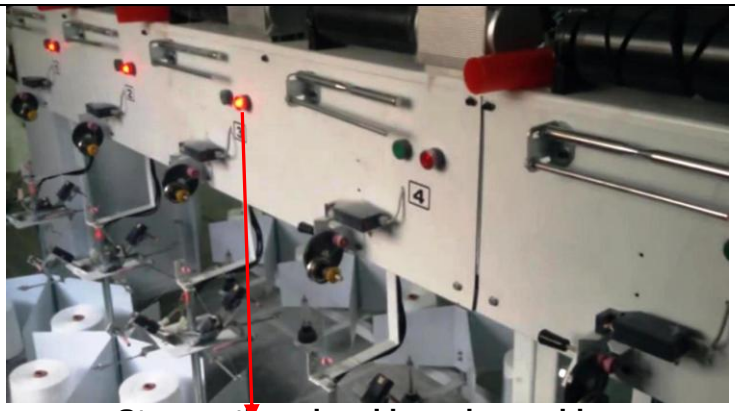


Crade to hold the Cheese during winding

Counter rotating blades for traverse



Schematic diagram of Counter rotating blades for yarn traverse

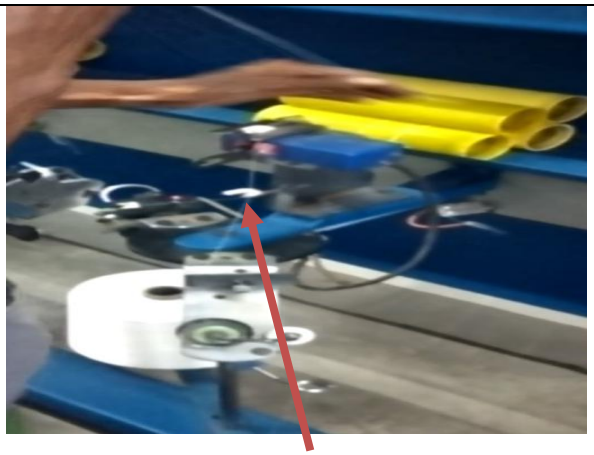
Display Panel: ➢ It displays various operating machine parameters like speed, production, Count of yarn etc. Understand the details in the display panel and work accordingly.	
Signal Lamps: ➢ Signal lamps are provided on the machine to indicate the reason for stoppage of drums. Understand each signal lamp and their purpose in the machine.	 **Stop motion signal lamp in machine**

6. Operating Propeller Winding Machine:

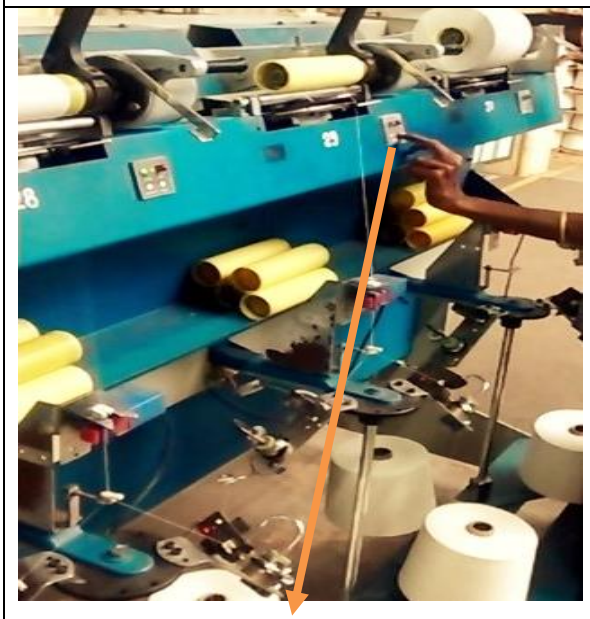
- Creel the required number of cones in the cone holders.
- Operate the control switches for starting and stopping the machine.
- Follow the different signal lamps in the machines.
- View the display panel and identify the reasons for stoppages if any.
- Inform the supervisor in case of any break-downs.
- See that the tension weight on each head is as specified for the count running.
- Ensure that the EYC setting is as instructed.
- Ensure the functioning of stop motion for every individual winding head
- Follow instructions/direction of supervisors, during count changes.
- Attend to yarn breakage by using Knotter / Splicer

- Follow the instructions of the supervisor for knotting / Splicing
- After Knotting trim the knotted portion with scissor provided.
- Once the cheese reaches required size, doff the full Cheeses
- Identify and report the different package defects to the supervisor.
- Transport empty cones to winding department.
- Carryout cleaning activities in the Creel, thread guide, Tension weight and Cheese holder etc.,
- Remove the suction waste from OHTC periodically & segregate the wastes collected and put them in the designated bins.
- Always keep machine area clean.

Creeling of cones



Taking yarn from cone after creeling



Operating control switches

Ensuring tension weight and functioning of EYC

Importance of Colour coding:

The details related to colour coding like cone tip colour, empty cheese colour and other relevant information like Count of yarn wound, no of plies etc, are normally displayed in respective machine's display board. It is the responsibility of the machine operator to understand them & work accordingly.

Importance of no of ply:

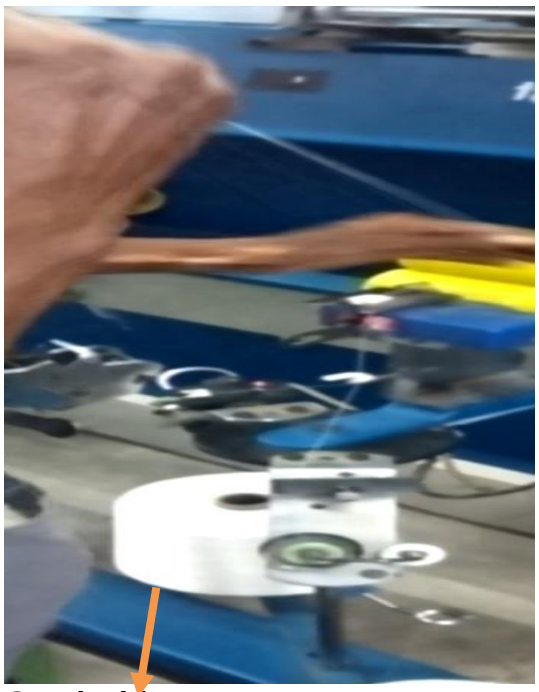
In propeller winding machine two or more single yarn are fed for plying and winding on to Cheese. It is the responsibility of the operator to understand the no of ply working in the machine or drums allotted to him /her.

Identifying Defects:

- Defects in cones received for feeding like irregular shaped cones, soft or hard cones, stitches formation in cones, stains, Ribbon formation etc are to be identified and informed to supervisor for necessary action.
- Defects in the winding cheese (Paralleled yarn cheese) like damaged cheese, stitches, Singles, wrong ply, cuts in yarn etc, are to be identified and informed to supervisor for necessary action.

Creeling the Cones

- Bring the correct colour coded cones in the trolley from storage area for creeling the Propeller winding machine
- Patrol around the machine and identify the cone exhaust.
- Replace the exhausting cones from the cone holder and place the full cones.
- Always make it a practice to creel with equal sized cones in feeding cone holders
- Check and ensure that the cones are properly creeled
- Check every individual spindle and ensure that the cheese is not idle due to feeding cones exhaust.
- Always take minimum time to creel the cones safely

 **Identify the running out cones**	 **Creel with new cones**

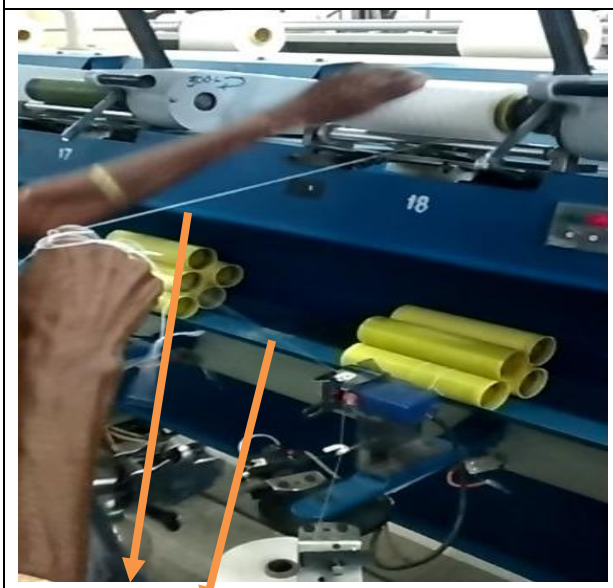
Attending to breakage and restarting

- While attending to breaks or while replacing exhausted cones first lift the Cheese spindle from the surface of the roller
- Properly stop the cheese spindle before knotting.
- Take out the thread from the cheese first.
- Then take out the yarn from cones through Tension weight, EYC and thread guides of paralleled yarn.
- Knot / splice the thread from Cheese with paralleled yarn from cones.
- Adopt proper procedure as instructed for operating the knotters / splicer for knotting or splicing
- Knot / Splice the breakage with minimum loss of time and with minimum waste.
- After knotting trim the knotted portion using the scissor provided, to ensure quality of yarn
- Now press down the cheese holder lever for winding to continue
- Check whether the cheese is properly seated and the plied yarn is properly being wound on the cheese uniformly.
- Ensure that the traverse of yarn takes place properly

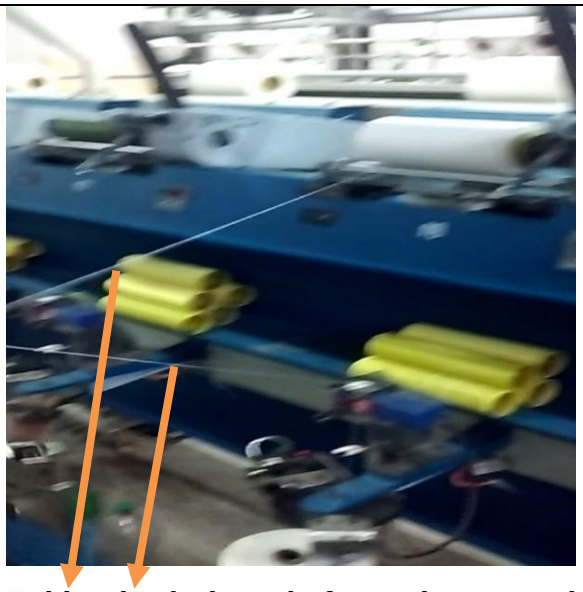
- Collect the hard waste while attending to breaks and put them in the hip bags or Apron pocket given
- Always ensure safety while knotting / Splicing the yarn

Taking broken thread from cheese

Taking broken thread from cones and passing through tension weight,EYC & thread guides



Taking both threads from cheese and cones for Knotting



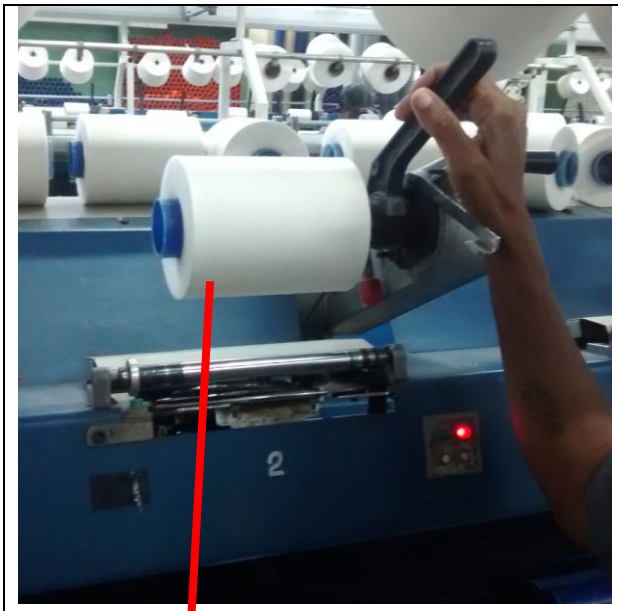
Taking both threads from cheese and cone for Knotting

 **Knotting the threads with knotter**	 **Trimming the knotted threads with scissor**

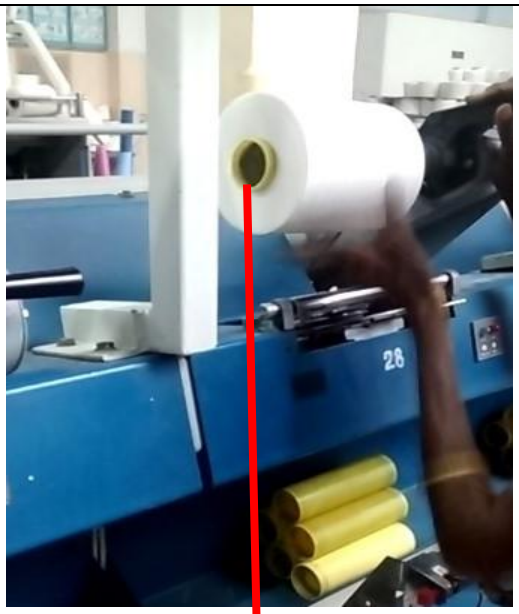
Doffing the Cheese package and restarting winding

- When the running cheese reaches specified size, prepare to doff the cheese.
- Patrol around the machine and ensure the winding stage is ready for doffing.
- Check the Cheese package is fully wound to the predetermined size and start doffing.
- Ensure the availability of correct colour coded empty cheese for doffing.
- Take the correct colour coded empty cheese in hand.
- First break the yarn from the full cheese
- Remove full Cheese package from cheese holder and keep them on the space provided in the machine.
- Insert the empty cheese for winding
- Take the thread to the empty cheese in hand and wind manually few rounds.
- Fix the cradle, operate the control switch and ensure that the winding takes place smoothly.
- Also ensure to check for proper yarn traverse through the movement of counter rotating blades.
- Place the doffed Cheese in the trolley and transport to the storage area as instructed.
- Reserve the correct colour coded empty Cheese in the reserve area in the machine for facilitating next round of doffing

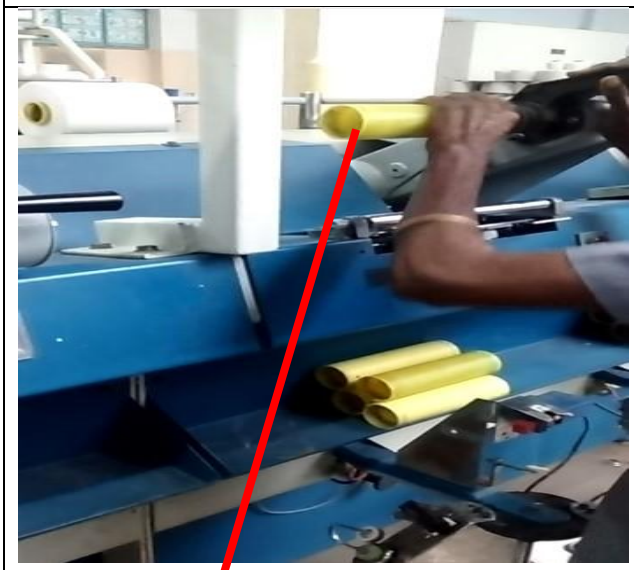
- Keep the hard waste removed during doffing in separate waste collection boxes.



Identifying full cheese

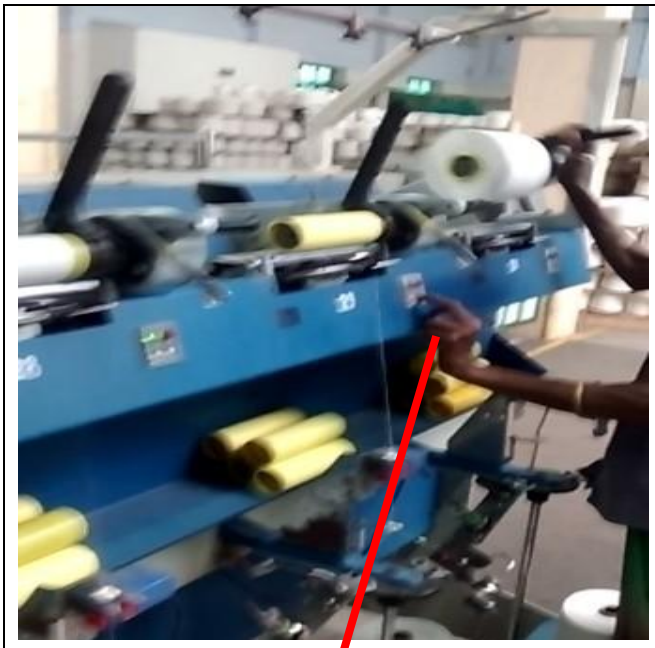


Taking out the full wound Cheese



Inserting empty cheese after doffing

Winding thread on empty cheese

 **Press the control switch and ensure winding**	 **Taking hard waste and put in apron or hip bags**

Cleaning of propeller wingding machine & Waste disposal

- Clean the different mechanisms in the machine at scheduled intervals as instructed.
- Ensure the yarn passage from cones to cheese are clean
- Periodically clean the thread guides, EYC and tension weight units.
- Always keep the entire yarn passages from cones to cheese being wound, free from dirt & fluff to ensure good yarn quality.
- Keep the wastes in waste bags, piecer bags, or in apron pockets.
- Properly handle full cones, empty cheese and full cheese
- Clean the waste accumulation from different parts of the machine from time to time.
- Use proper tools for cleaning.
- Ensure safety while carrying out cleaning activities.
- Clean the wastes in the propeller winding machine area.
- Ensure OHTC is running continuously.
- Collect waste from OHTC at periodical intervals.

7. Instructions during Shift Change:

Take Charge of the Shift

- Come at least 10 - 15 minutes earlier to the work spot.
- Meet the previous shift operator and discus regarding the issues faced by them with respect to the quality or production or spare or safety or any other specific instruction etc.
- Understand the count produced, No of Plies, colour coding followed in the propeller winding for his allocated number of drums or machines.
- Check the technical details are mentioned in the display board in Propeller Winding machine
- Check for the availability of the cones for feeding the machine.
- Check for the availability of the correct colour coded empty cheeses for the count running.
- Check all the cheeses are running properly, if any cheese is idle enquire for the reason and report to the supervisor.
- Check the cleanliness of the machines & the work area.
- Check whether any spare/ tool / cones/cheeses or any other material are thrown under the machines or in the other work areas.
- Check the Over Head Travelling Cleaner (OHTC) is working properly

Handing over the Shift:

- Properly hand over the shift to the incoming shift operator.
- Provide the details regarding count produced, No of Plies, colour coding followed in the Propeller Winding for his allocated number of drums or machines.
- Provide all relevant information regarding idle winding head and damaged machine parts if any.
- Collect the wastes from waste collection bags weigh them and transport to storage area.
- Check for the cleanliness of the work place.
- Get clearance from the incoming counterpart before leaving the work spot, in case if the next shift operator does not come, report to shift supervisor.
- Report to the shift supervisor about the quality / production / safety issues/ any other issues faced in the shift and leave the department only after getting concurrence for the same from supervisor.

8. Importance of Health & Safety:

- Follow the work & safety instructions and adopt safe working practices like not opening the doors of the machine, not cleaning the interior parts & not taking any choked material when the machine is in running condition.
- Do not take your hands very close to counter rotating blades while it is working.
- Always use head cap, face mask and ear plug in the work spot.
- Do not carry any metallic parts during machine running as there are chances of fire and damage to machine parts.
- Take action based on instructions in the event of fire, emergencies or accidents, and participate in mock drills/ evacuation procedures organized at the workplace as per the organization procedures.