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## 1. BASIC TEXTILE WET PROCESSING TERMS

**ABSORBENCY:** The ability of one material to take up another material.

**BLEACHING:** It is a process to remove the natural and artificial impurities in fabrics to obtain clear white for finished fabric or in preparation for dyeing and finishing.

**CHEESE:** A cylindrical package of yarn wound on a flangeless tube.

**DENSITY:** The mass per unit volume

**DYEING:** It is a process of coloring fibers, yarns, or fabrics with either natural or synthetic dyes.

**DYES:** Substances that add color to textiles.

**EFFLUENT:** Waste water released after pretreatment, dyeing & finishing of Textile.

**FINISHING:** It includes various operations such as heat-setting, napping, embossing, pressing, calendaring, and the application of chemicals that change the character of the fabric.

**LUSTER:** The quality of shining with reflected light on textile material.

**pH:** Value indicating the acidity or alkalinity of a material.

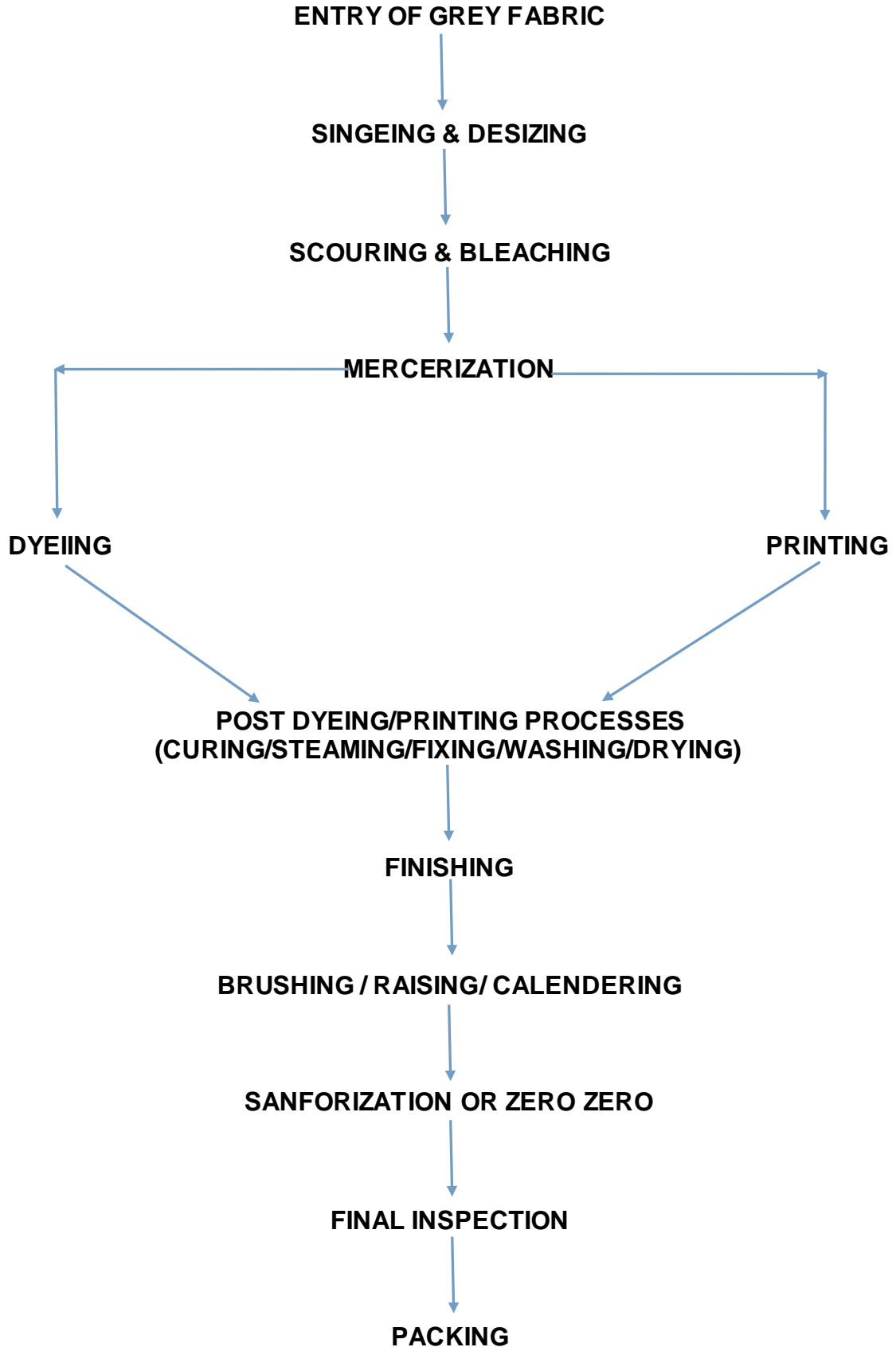
**PIGMENT:** An insoluble, finely divided substance, used to color fibers, yarns, or fabrics.

**SOFTENER:** A product designed to impart soft mellowness to the fabric.

**YARN:** A generic term for a continuous strand of textile fibers, filaments, or material in a form suitable for knitting, weaving, or otherwise intertwining to form a textile fabric.

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

## 2. SEQUENCE OF OPERATIONS IN WET PROCESSING

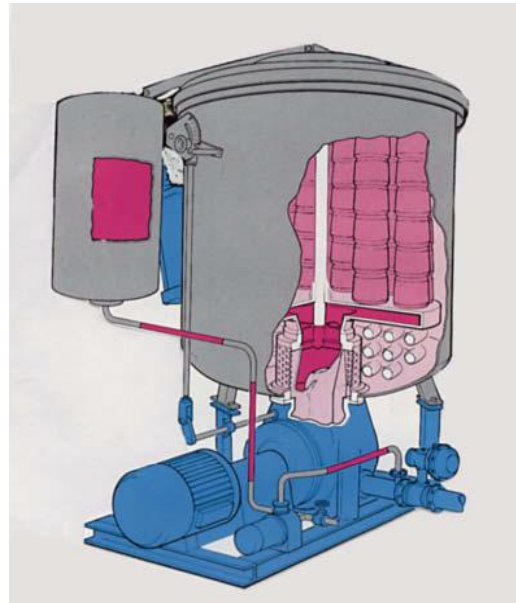


### 3. Brief note about HTHP Cheese dyeing machine:

The High Temperature High Pressure (HTHP) cheese dyeing machine is used for dyeing of yarn, which is required for producing multicolored stripes, check and jacquard fabric for attractive designs. The dyeing of yarn is carried in the form of cheese. The dyeing operation is carried out under higher temperature of above 100°C and under high pressure.



**Cheese wound on perforated tube**



**HTHP Cheese dyeing Machine**  
(cross sectional view)

#### Process flow in dyeing department:

- Soft winding
- Coloration of yarn
- Hydro extraction
- Drying

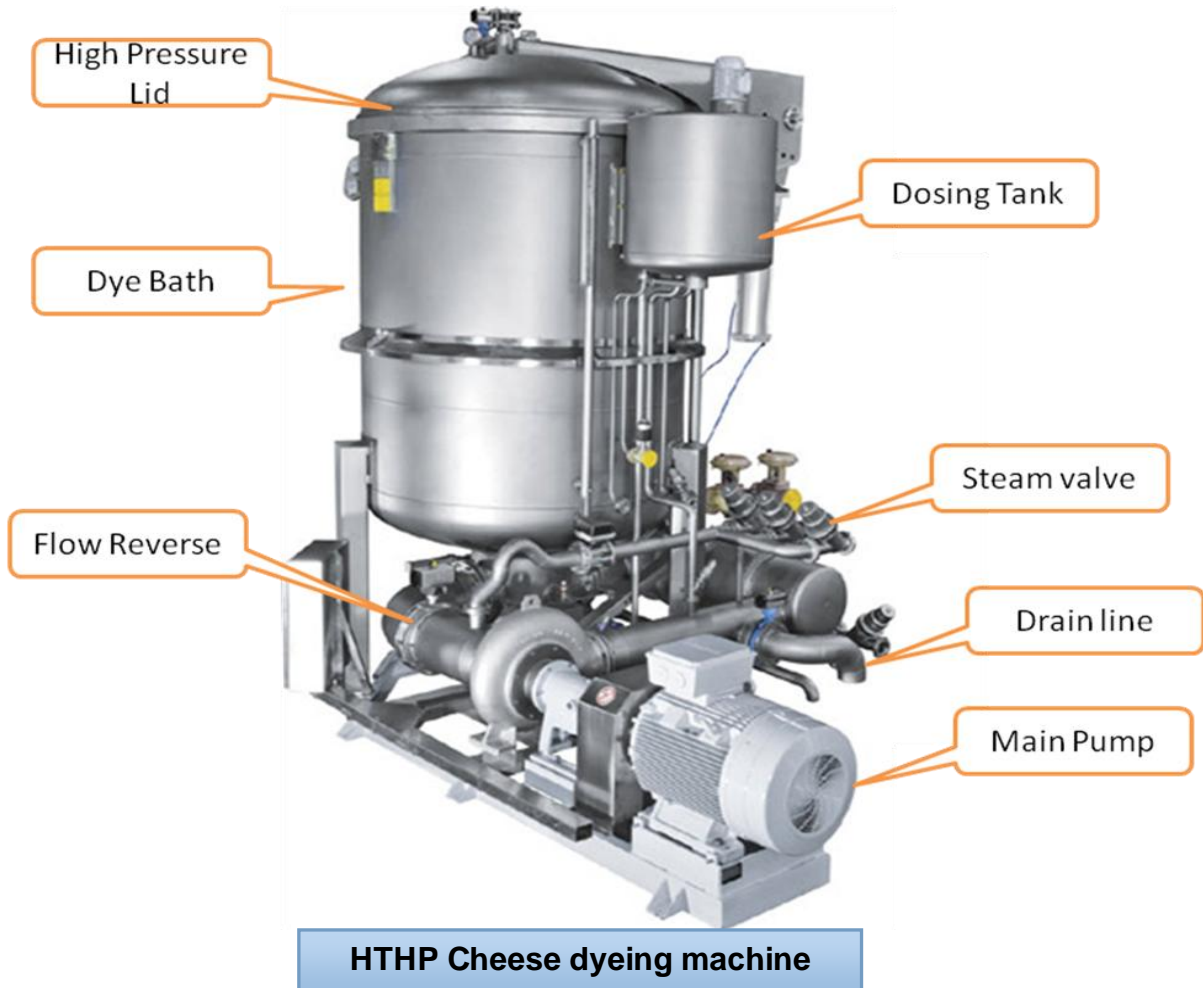
**Soft winding:** It is a process of Converting the cone form of yarn into cheese package. The yarn is wound on perforated cylindrical tubes.

**Coloration of yarn:** It consists of four major steps 1.Scouring & Bleaching (Improving absorbency and whiteness of the yarn) 2.Dyeing (Applying colour on the yarn) 3.washing (removal of unfixed dyes) 4.Finishing (Improving softness of yarn).

**Hydro extraction:** To remove the excess amount of water present in the yarn after dyeing by means of placing the cheese package in the arms of the high speed

rotating drum. Due to the centrifugal force the excess amount of water is removed up to 60 %.

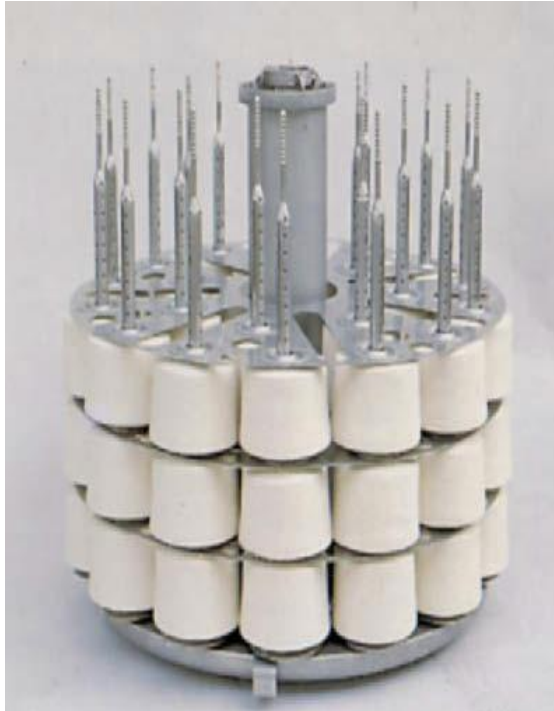
**Drying:** To complete drying of yarn.



The cheeses of yarn are inserted onto vertical, perforated spindles in the machine. Each spindle typically takes 8–10 packages but the vertical columns of packages do not touch. The dye liquor is pumped into the base of the frame and up through the perforated spindles. Thus the pre treatment chemicals/dye is applied on the cheese.

#### 4. Details of HT-HP Cheese Dyeing Machine:

**Bobbin carrier:** It consists of number of spindles to hold the soft packages in column. Perforations at the bottom of these carriers, allow bi-directional circulation of dye and other chemical solution through the yarn packages.



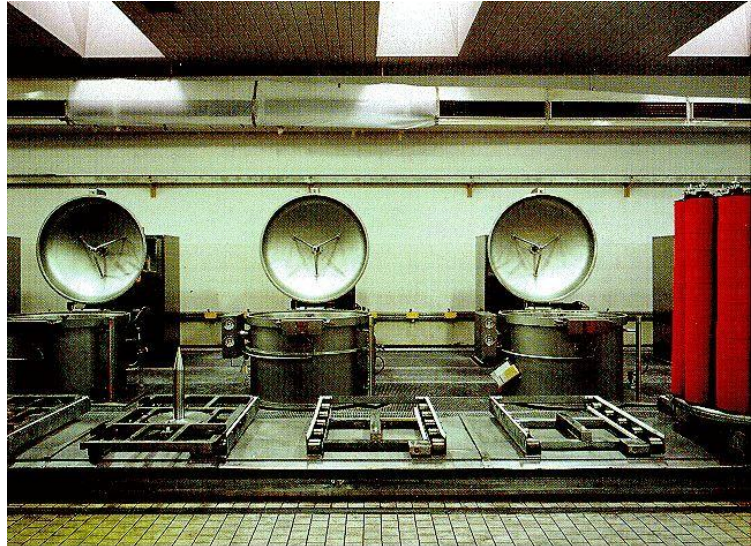
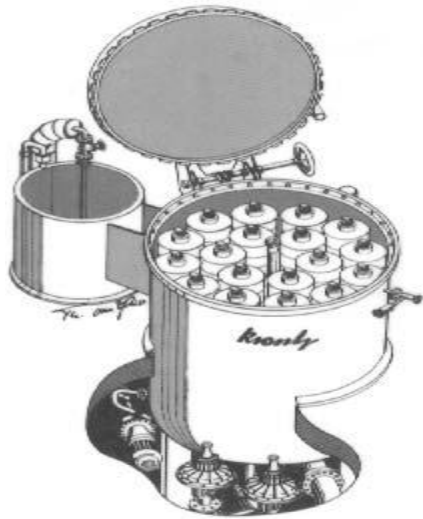
**Bobbin carrier**



**Empty bobbin carrier (top view)**

**Autoclave:** In this unit actual dyeing is carried out. It is a hollow vessel accompanied by a Motor and a High speed pump which is capable of circulating liquor bi- directionally. This vessel is inter-connected to the preparation and addition tank. More over actual dyeing pressure, liquor volume, temperature are controlled and maintained throughout the process. Following figures shows the construction of autoclave.

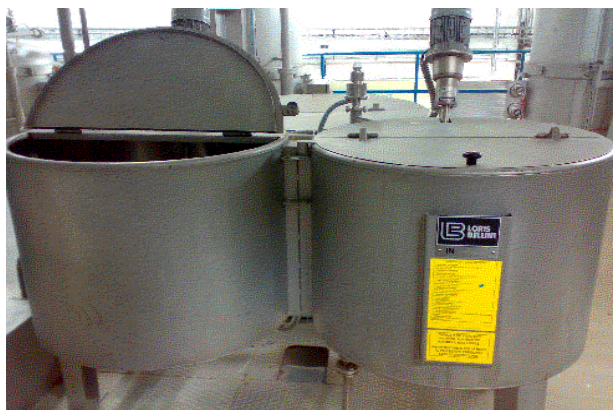
## Autoclave construction



**PREPARATION TANK:** All the chemicals are made and mixed in this tank and also store the excess chemicals for the next operation.



**Addition tank:** In this tank all the dyes and other chemicals related to dyeing are added. It slowly injects dye fixing agent into main vessel.



### 5. Operating of HT-HP Cheese Dyeing machine:

- ❖ Understand and follow the instruction from lot card and programme book.
- ❖ Switch on main power then open compressed air, water valve and steam.
- ❖ Check the quality and lot number of the cheeses before putting on the machine by checking the label.
- ❖ Transport the fully loaded bobbin carrier in to the dyeing vessel with the help of crane.
- ❖ Properly load the carrier into the machine.
- ❖ Fill the water in all the chemical preparation tank and set the temperature of all the processes.
- ❖ Set the recipe and other parameters like timing of each process, dye liquor forward reverse circulation and draining time etc.
- ❖ Observe for any defective cheeses, before and after loading in the machine. .
- ❖ Check actual flow rate of each chemical from flow meter as well as operating monitor.
- ❖ Prepare the chemical ready for entire process.
- ❖ Switch ON circulation while starting the machine.



- ❖ Check the whiteness Index, pH and absorbency of the yarn after scouring and bleaching is completed.
- ❖ If the Scouring & bleaching results are as per requirement specified prepare for dyeing
- ❖ After dyeing is completed take out the Bobbin carrier from the machine after allowed time to open the machine
- ❖ If the machine stops for long time, immediately release pressure inside the dyeing chamber and minimise inside dyeing temperature.
- ❖ Take the bobbins to Hydro extractor and load the cheeses in the Hydro extractor
- ❖ Run the Hydro extractor for the specified time to remove water from cheese.
- ❖ Collect the cheese from hydro extractor and keep them in Radio Frequency dryer for complete drying.
- ❖ Keep the dried cheese at designated place for hard winding and further packing.
- ❖ Check for various process damages in the finished yarn like stains, dust, chemicals, rust, handling stains, shade variations in cheese are inform to shift officer.



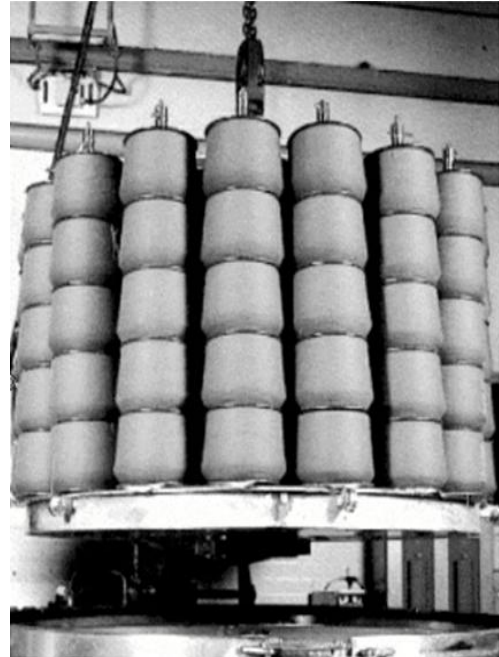
**Soft winding (cone into cheese)**



**Undyed Cheeses ready for dyeing**



**Empty bobbin carrier**



**Fully loaded bobbin carrier**



**Placing the carrier into dyeing vessel**



**Preparation of chemicals and dyes into the preparation**



Setting the programme in main panel



Unloading of cheese after dyeing



**HYDRO  
EXTRACTOR**

Loading into hydro extractor (Removal of water from cheeses)



**Radio frequency drier**



**Collecting dried cheeses into box**

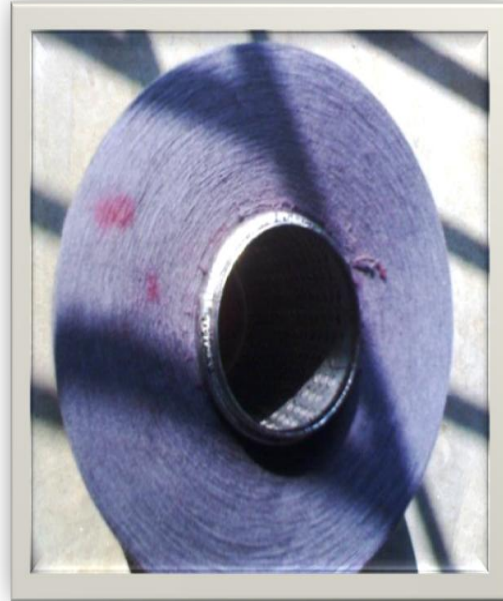


**Finally cheeses are rewound onto cones (Hard winding section)**

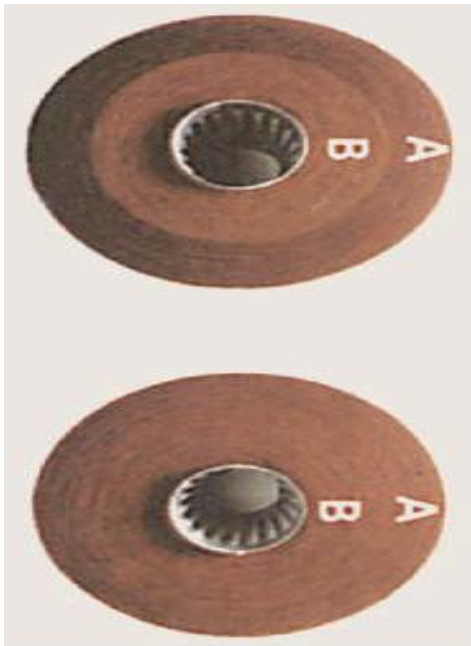
## Various defects in cheese dyeing



**Unlevel dyeing cheese**



**Colour stain**



**Shade variations**



**Oily stains**

## **Cleaning in HT-HP Cheese Dyeing machine**

- ❖ Clean the Bobbin Carrier and ensure it is free from yarn waste.
- ❖ Clean all the preparation and additional tanks in every process change.
- ❖ Clean the main dyeing tank with necessary chemicals after every process change.
- ❖ Clean all the level sensor and temperature sensor.
- ❖ Collect all the waste and dispose as instructed by supervisor.
- ❖ Store the collected waste at designated place.

## **6. INSTRUCTIONS DURING SHIFT CHANGE OVER:**

### **Taking charge of duties while starting of shift:**

- ❖ Come at least 10 - 15 minutes earlier to the work place.
- ❖ Meet the previous shift operator and discuss 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 cheese being processed & process running on the machine.
- ❖ Ensure the technical details are mentioned on the job card & displayed on the machine.
- ❖ Check the next batch to be processed is ready near the machine .
- ❖ Check the cleanliness of the machines & other work areas.
- ❖ Question the previous shift operator for any deviation in the above and bring the same to the knowledge of the shift superior.

### **Handing over charge at the end of shift:**

- ❖ Properly hand over the shift to the incoming operator.
- ❖ Provide the details regarding Cheese quality & the process running on the machine.

- ❖ Provide all relevant information regarding the stoppages or breakdown in the machine, any damage to the material or machine.
- ❖ Ensure the next lot to be processed is ready near the machine
- ❖ Get clearance from the incoming counterpart before leaving the work spot.
- ❖ Report to the shift supervisor in case the next shift operator doesn't report for the shift.
- ❖ Always ensure to hand over the shift properly to the incoming shift operator .
- ❖ Report to the shift superior about the quality / production / safety issues/ any other issue faced in the shift and should leave the department only after getting concurrence for the same from superiors.
- ❖ Collect the wastes from waste bags, weigh them & transport to storage area.

### **8. Importance of Health and Safety:**

- ❖ Use and maintain personal protective equipment such as Hand Gloves, Gum Boots, head cap etc., as specified.
- ❖ Never handle chemicals with bare hands
- ❖ Report any service malfunctions in the machine that cannot be rectified to the supervisor.
- ❖ Store materials and equipment at their designated places.
- ❖ Minimize health and safety risks to self and others due to own actions .
- ❖ Monitor the workplace and work processes for potential risks.
- ❖ 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 organization procedures.